MITSUBISHI ELECTRIC

TECHNICAL BULLETIN

FA-A-0060-C

Procedures for Replacing Positioning Module AD71 with QD75

■Date of Issue

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■Relevant Models

QD75P1N, QD75P2N, QD75P4N, QD75D1N, QD75D2N, QD75D4N

Thank you for your continued support of Mitsubishi Electric programmable controllers, MELSEC series.
This bulletin is written for those intending to replace the AD71/A1SD71/AD71S2/AD71S7/A1SD71-S2/A1SD71-S7 positioning module with the QD75P1N/QD75P2N/QD75P4N/QD75D1N/QD75D2N/QD75D4N, and includes the relevant information (such as specification changes), method of replacement and recommended equipment.
The AD71/A1SD71/AD71S2/AD71S7/A1SD71-S2/A1SD71-S7 can also be replaced with the made-to-order models, QD75P1/QD75P2/QD75P4/QD75D1/QD75D2/QD75D4.
For differences between QD75P□/QD75D□ and QD75P□N/QD75D□N, refer to the following technical bulletin.
News on the replacement models for MELSEC-Q series positioning modules FA-A-0115

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1 ABBREVIATIONS

In this bulletin, the following abbreviations are used to refer to the model names of modules.

Abbreviation	Model name
AD71	AD71, AD71S1, AD71S2, AD71S7, A1SD71-S2, A1SD71-S7
AD71S2	AD71S2, A1SD71-S2
AD71S7	AD71S7, A1SD71-S7
QD75*1	QD75P1N, QD75P2N, QD75P4N, QD75D1N, QD75D2N, QD75D4N
QD75P□N*1	QD75P1N, QD75P2N, QD75P4N
QD75D□N*1	QD75D1N, QD75D2N, QD75D4N

*1 The QD75 has two types, namely QD75P□N and QD75D□N, according to the output types of command pulses. Choose between the two types according to the output type of the existing AD71. (□ refers to the number of axes.)
QD75P□N: Open collector output
QD75D□N: Differential driver output
In addition, this bulletin uses the model names of "QD75P□N" and "QD75D□N" when explanations unique to each module are necessary because of the differences (such as specifications) between the modules.

2 OVERVIEW OF COMPARISON BETWEEN AD71 AND QD75

The performance of the QD75 is improved compared to the AD71, as explained below:

Reduced start processing time

The start time is reduced by speeding up the positioning start processing.

Module	Independent positioning	2-axis linear interpolation positioning
AD71	58ms	94ms
QD75	1.5ms	1.5ms

Easier maintenance

- Positioning data and parameter settings are stored in the module flash ROM; therefore data can be retained without the need for batteries.
- The history function enables checking of historical data such as start, errors or warning data.
- The module error history function enables checking of errors saved in the CPU module on GX Works2 after power-off. In addition, GX Works2 provides an easier method to reconfigure positioning data, debug the positioning control system.

3 FUNCTIONAL COMPARISON BETWEEN AD71 AND QD75

3.1 List of Functional Comparisons

The following table shows functional comparisons between the AD71 and QD75.

For programs, refer to the following.

☞ Page 25 POSITIONING CONTROL PROGRAMS

○: Compatible (no restrictions), △: Compatible (with restrictions), ×: No alternative

Function			AD71				QD75		Compatibility
			AD71	AD71S1	AD71S2 A1SD71-S2	AD71S7 A1SD71-S7	QD75P2N	QD75D2N	
No. of control axes			2 axes				2 axes		○
Manual pulse generator operation			Available		—	Available	Available		△*1
Applicable manual pulse generator			HD52B (Mitsubishi Electric Corp.), OSM-01-2(C) (Nemicon Corp.)				MR-HDP01 (Mitsubishi Electric Corp.)		Usable products are different between AD71 and QD75.
JOG operation			Available				Available		○
Zero point return			Available				Available		○
Positioning	Position control mode	1-time positioning (End)	Available				Available		○
		n-time positioning (Continued)	Available				Available		○
		Continue positioning, while changing speed (Pattern change)	Available				Available		○
	Linear interpolation		Available				Available		○
	Speed/Position control switching mode		—		Available	—	Available		○
	Speed control mode		—		Available	—	Available		○
No. of positioning data			400/axis				600/axis		○
Acceleration/Deceleration time			Same for Accel./Decel. times (1 pattern)				Individual setting for Accel./Decel. time (4 patterns for each)		○
Backlash compensation			Available				Available (Do not use the function for an axis to be connected to the stepping motor.)		△
Error compensation			Available				N/A		△*2
M code			Available				Available		○
M code comment display			Available				N/A		×
Data storage			SRAM (with battery backup)				Flash ROM (without battery)		△*3
No. of occupied slots			32 points/slot		AD71S2, AD71S7: 32 points/slot		32 points/slot		△*4
					A1SD71-S2, A1SD71-S7: 48 points/2 slots				
I/O signal lines	Upper/Lower limit signal (Input signal)		N/A				Available		Wiring is required for QD75.
	START signal (Output signal)		Available				N/A		×*5
	Pulse output (Output signal)		Open collector	Differential driver	Open collector		Open collector	Differential driver	○
	Other signals		Available				Available		○
Current consumption			1.5A (0.8A for A1SD71-S2/S7)				0.30A	0.45A	—

*1 The number of manual pulse generators that one module of QD75 can use is one. For details, refer to the following.
📖 Type QD75P/QD75D Positioning Module User's Manual
*2 The QD75 substitutes electronic gears.
*3 No. of writes to flash ROM is up to 100,000.
*4 Configure the StartXY address in the I/O assignment tab of the PC parameter to keep the address unchanged, when replacing the A1SD71-S2 and A1SD71-S7.
*5 Use an output module and create a program instead of using the signal. (☞ Page 6 Servo Amplifier Connection Examples)

3.2 Replacement Procedure Flowchart

This flow chart shows the procedures to replace the AD71 with the QD75. Perform the replacement by following the steps below.

1. Choose a positioning module for the replacement according to the output type of command pulses.
☞ Page 3 List of Functional Comparisons

2. Disconnect the wiring for AD71 and rewire for QD75.
☞ Page 5 Comparison Between AD71 and QD75 for Connecting the Signal Cable
☞ Page 6 Servo Amplifier Connection Examples

3. Rewrite the parameter data for QD75.
☞ Page 11 QD75 Parameter Settings (Comparison of Parameters Between AD71 and QD75)
☞ Page 15 QD75 Zero Point Return Parameter Settings
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4. Rewrite the positioning data for QD75.
☞ Page 17 POSITIONING DATA SETTINGS
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5. Rewrite the program for QD75.
☞ Page 20 DATA FOR POSITIONING CONTROL START
☞ Page 24 OS DATA AREAS (INCLUDING MONITOR INFORMATION)
☞ Page 25 Differences in I/O Signals
☞ Page 25 Precautions for Replacing AD71 with QD75
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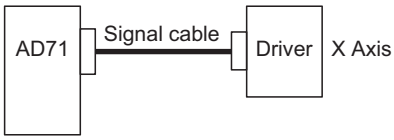
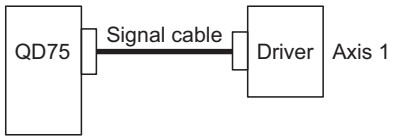
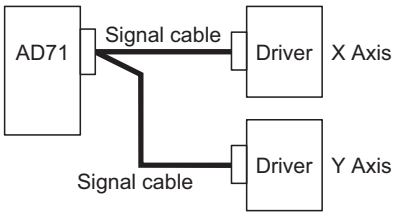
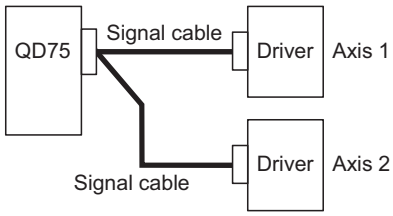
6. Perform a test operation using the JOG function.
☞ Page 27 Programming Restrictions
☞ Page 27 Program Examples for QD75
☞ Page 39 QD75 TEST OPERATION

4 REWIRING

4.1 Comparison Between AD71 and QD75 for Connecting the Signal Cable

Item	AD71	QD75
1-axis control	 AD71 signal connector (40-pin) is common to X axis and Y axis.	 QD75 signal connector (40-pin) is common to Axis 1, Axis 2, Axis 3, and Axis 4.*2
2-axis control	 AD71 signal connector (40-pin) is common to X axis and Y axis. (Bifurcated type cable).	 QD75 signal connector (40-pin) is common to Axis 1, Axis 2, Axis 3, and Axis 4.*2
Connector type *1	Connector Connector cover) Set: A6CON Manufacturer: Mitsubishi Electric Corp.	Connector Connector cover) Set: A6CON Manufacturer : Mitsubishi Electric Corp.

*1 The connector and connector cover are included with the AD71. They are not included with the QD75, but sold separately.
*2 Both QD75P4N and QD75D4N have two types of signal connectors. One connector is used for Axis 1 and Axis 2, and another is used for Axis 3 and Axis 4.

Signal cable

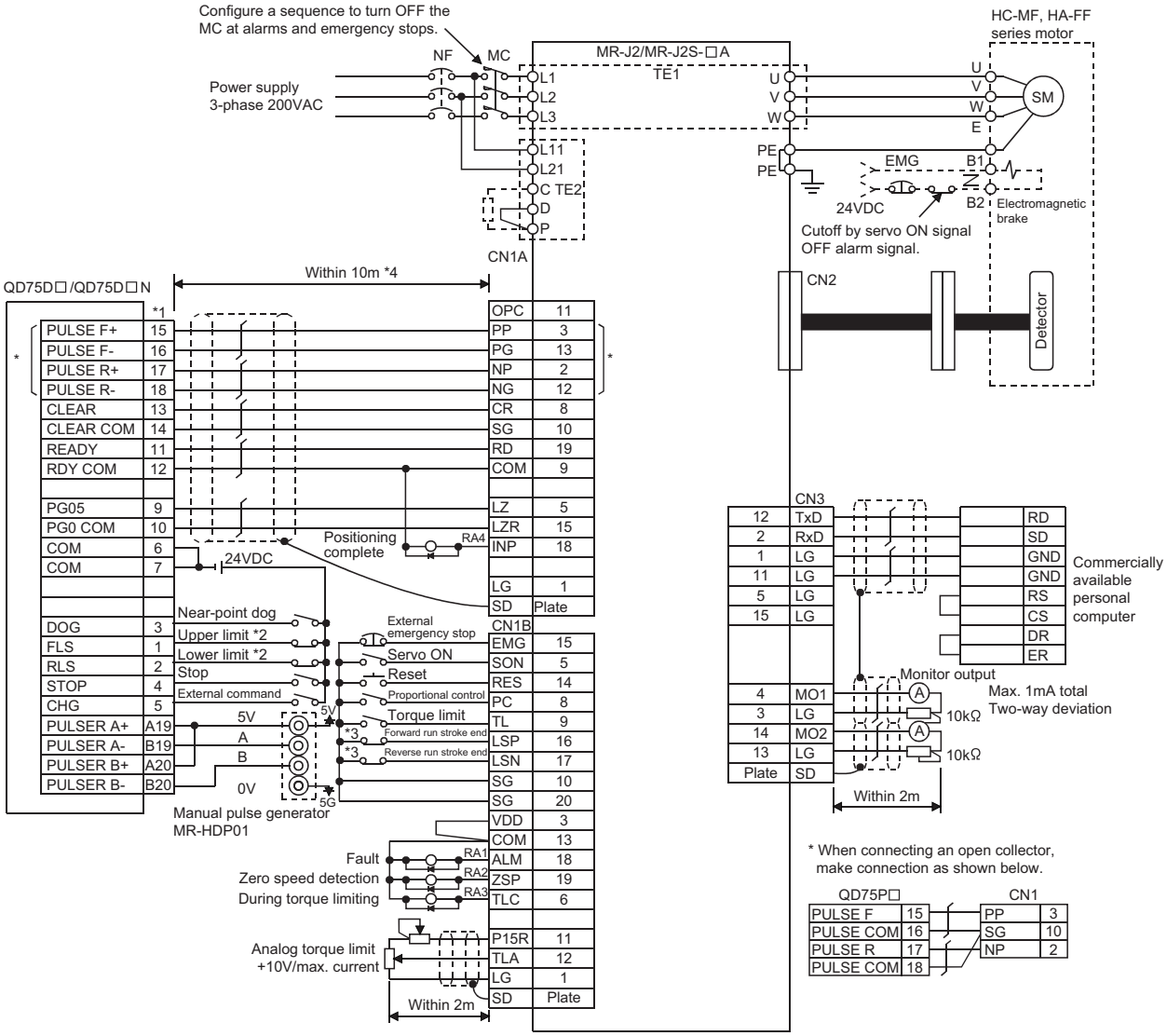
New signal cables are required for the QD75, as the signal specifications of the QD75 for the external connection are different from those of the AD71.

4.2 Servo Amplifier Connection Examples

For the pulse output, choose either the open collector or the differential driver depending on the external device. It is recommended to make differential driver connection since differential driver connection is superior to open collector connection in max. output pulse and max. connection distance between servos. (📖 Type QD75P/QD75D Positioning Module User's Manual)

Connection example with the servo amplifier MR-J2/J2S-□A (Differential driver)

Use the same logic (positive logic/negative logic) for the QD75D□N and servo amplifier. The QD75D□N is initially set to negative logic.



*1 The logic for each I/O terminal can be changed with "[Pr.22] Input signal logic selection" and "[Pr.23] Output signal logic selection" in detailed parameters 1. (Negative logic is used for all terminals in the above diagram.)

*2 The QD75D□N upper limit (FLS) and lower limit (RLS) are used in the OPR retry function. Set them closer to the center compared with the servo amplifier limit switches. When not using the upper limit signal (FLS) and the lower limit signal (RLS) of the QD75D□N, refer to the following.

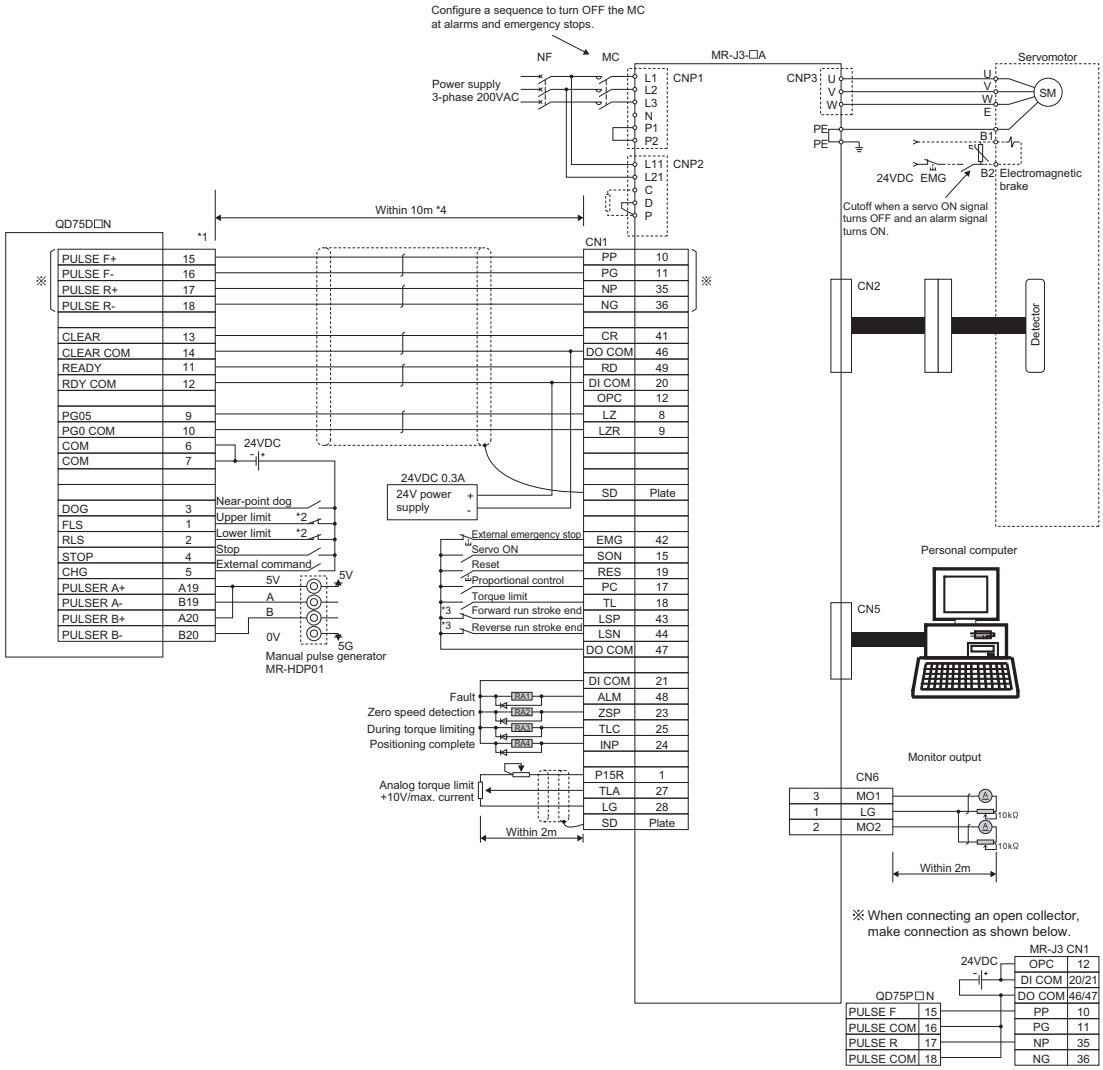
☞ Page 9 When not using the upper limit signal (FLS) and the lower limit signal (RLS) of the QD75D□N

*3 These are limit switches for the servo amplifier (for stop).

*4 This indicates the distance between the QD75D□N and servo amplifier.

Connection example with the servo amplifier MR-J3-□A (Differential driver)

Use the same logic (positive logic/negative logic) for the QD75D□N and servo amplifier. The QD75D□N is initially set to negative logic.



*1 The logic for each I/O terminal can be changed with "[Pr.22] Input signal logic selection" and "[Pr.23] Output signal logic selection" in detailed parameters 1. (Negative logic is used for all terminals in the above diagram.)

*2 The QD75D□N upper limit (FLS) and lower limit (RLS) are used in the OPR retry function. Set them closer to the center compared with the servo amplifier limit switches. When not using the upper limit signal (FLS) and the lower limit signal (RLS) of the QD75D□N, refer to the following.

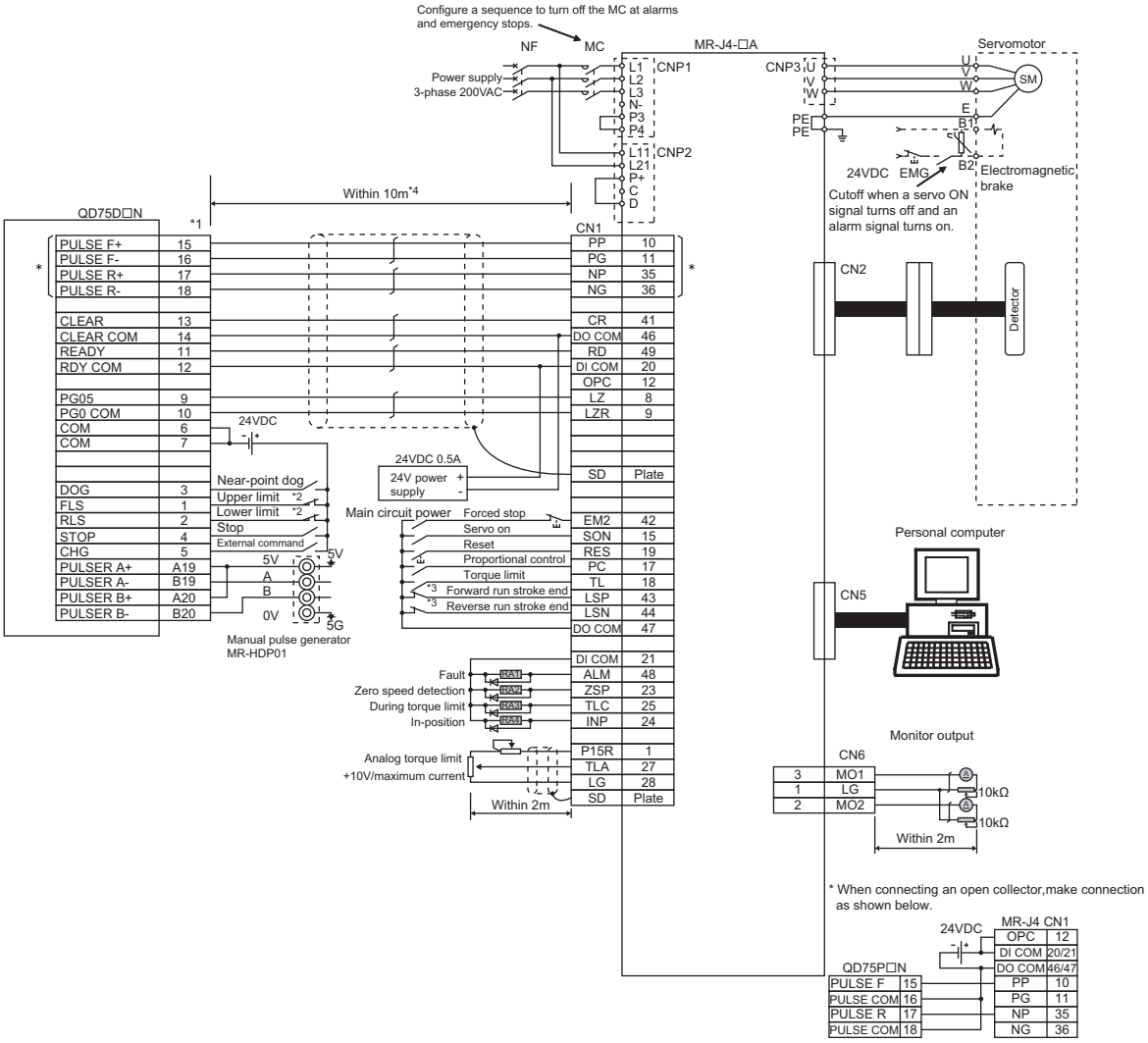
☞ Page 9 When not using the upper limit signal (FLS) and the lower limit signal (RLS) of the QD75D□N

*3 These are limit switches for the servo amplifier (for stop).

*4 This indicates the distance between the QD75D□N and servo amplifier.

Connection example with the servo amplifier MR-J4-A (Differential driver)

Use the same logic (positive logic/negative logic) for the QD75D☐N and servo amplifier. The QD75D☐N is initially set to negative logic.



*1 The logic for each I/O terminal can be changed with "[Pr.22] Input signal logic selection" and "[Pr.23] Output signal logic selection" in detailed parameters 1. (Negative logic is used for all terminals in the above diagram.)

*2 The QD75☐N upper limit (FLS) and lower limit (RLS) are used in the OPR retry function. Set them closer to the center compared with the servo amplifier limit switches. When not using the upper limit signal (FLS) and the lower limit signal (RLS) of the QD75D☐N, refer to the following.

☞ Page 9 When not using the upper limit signal (FLS) and the lower limit signal (RLS) of the QD75D☐N

*3 These are limit switches for the servo amplifier (for stop).

*4 This indicates the distance between the QD75D☐N and servo amplifier.

When not using the upper limit signal (FLS) and the lower limit signal (RLS) of the QD75D□N

Depending on whether or not to wire the upper limit signal (FLS) and the lower limit signal (RLS), perform either of the following. (If the following operation is not performed, an error (error code: 104 or 105) will occur at start-up.)

- When wiring the upper limit signal (FLS) and the lower limit signal (RLS), set "Negative logic" (default) for "[Pr.22] Input signal logic selection" in Detailed parameters 1, and connect a 24VDC external power supply.
- When not wiring the upper limit signal (FLS) and the lower limit signal (RLS), set "Positive logic" for "[Pr.22] Input signal logic selection" in Detailed parameters 1.

For details, refer to the following.

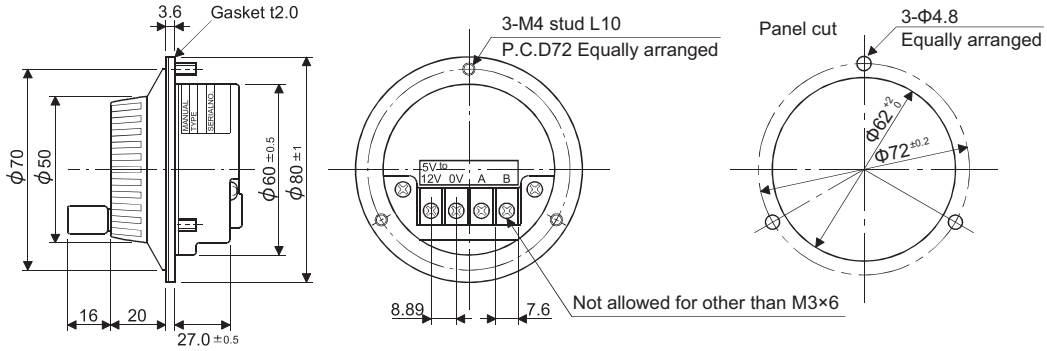
📖 Type QD75P/QD75D Positioning Module User's Manual

When manual pulse generator is used

The manual pulse generator (OSM-01-2(C)) for the AD71 is not compatible with the QD75D, therefore it is recommended to use one designed for the QD75D□N. (Recommended product for QD75D□N: MR-HDP01 manufactured by Mitsubishi Electric Corp.)

The input pulse from the manual pulse generator (MR-HDP01) is counted in multiples of 4.

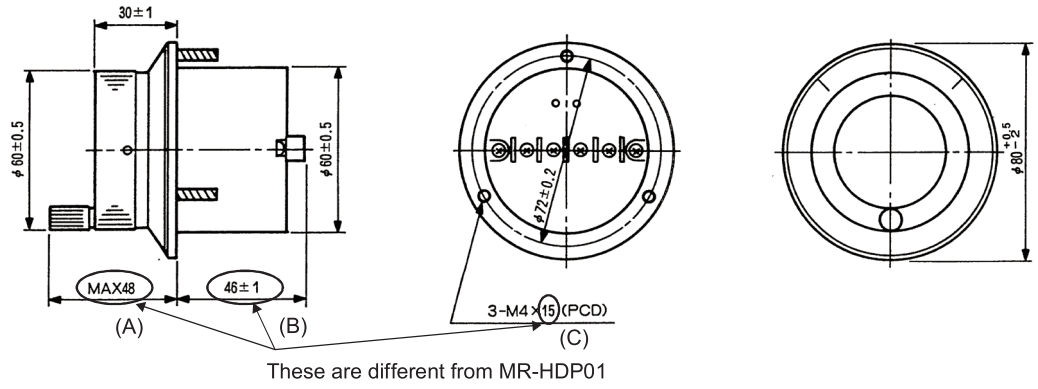
- MR-HDP01 external dimensions



Unit: mm

The dimensions of the manual pulse generator for the AD71 are different from those for the QD75D□N at the three points ((A), (B), and (C)) as shown in the "OSM-01-2(C) external dimensions" below. Please pay attention to the differences when replacing the manual pulse generator.

- OSM-01-2(C) external dimensions



Unit: mm

Speed/position switching enable signal (1A, 1B) for the AD71S2

Since Speed/position switching enable signal (1A, 1B) for the AD71S2 is replaced with [Cd.24] Speed/position switching enable flag for the QD75, the way of switching the speed and position is changed accordingly. (For the QD75, the switching is performed by writing data to [Cd.24] Speed/position switching enable flag.)

When the START signals (for releasing mechanical brakes) (11A and 11B) of the AD71 are used

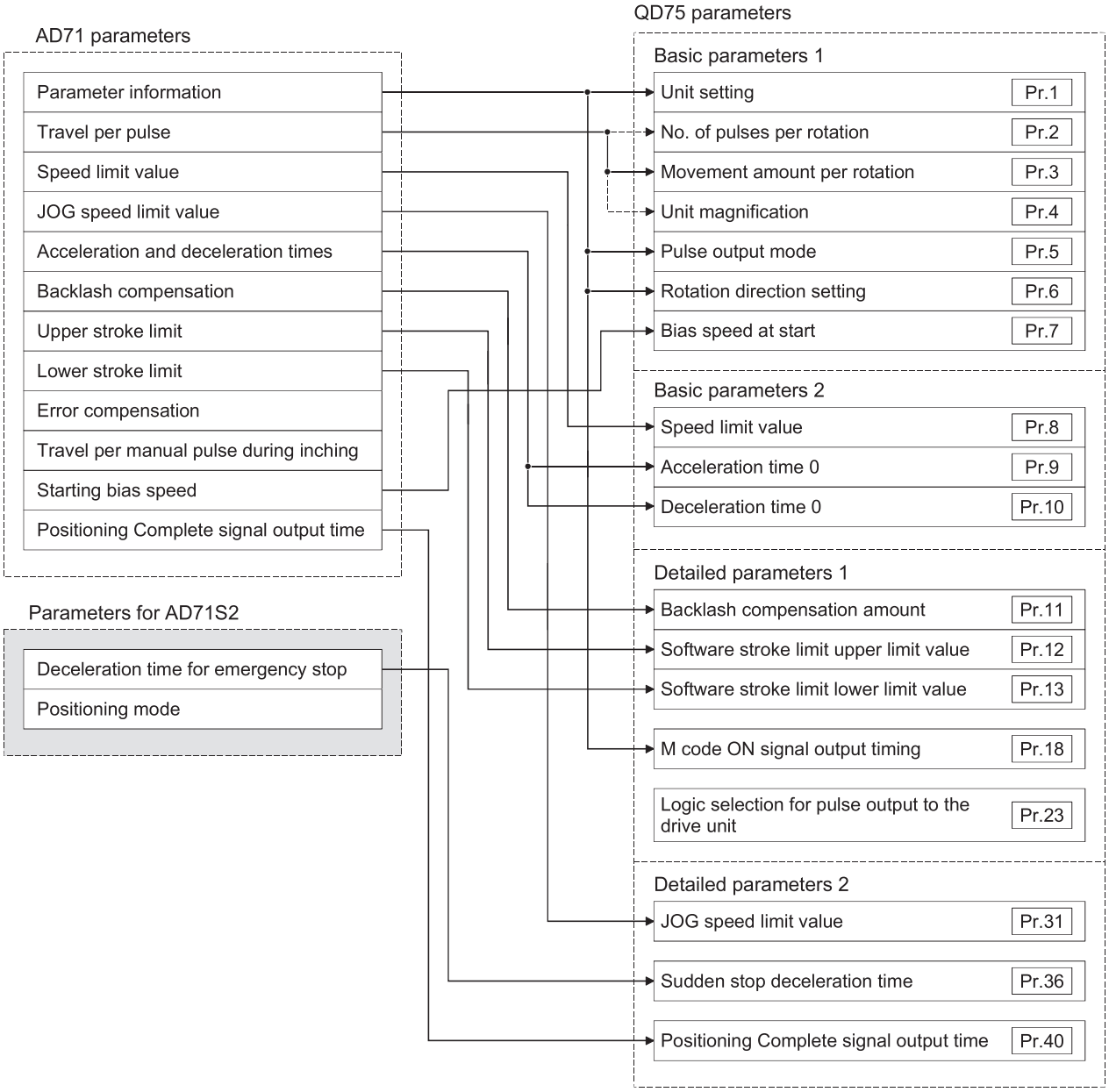
When replacing the AD71 where the START signals (for releasing mechanical brakes) (11A and 11B) are used with the QD75, substitute output signals (Y□) for the START signals by using an output module (such as the QY40P) and enabling the output signals (for releasing mechanical brakes) with a program.
Select an appropriate output module for your system.
The following table shows specifications of the AD71 START signal and output modules used for the QD75.

Item	START signal of AD71	Output module used for the QD75		
		QY10	QY40P	QY70
Output type	Open collector	Contact output	Transistor output (Open collector)	Transistor output (Open collector)
Load voltage	4.75 to 26.4VDC	5 to 125VDC	10.2 to 28.8VDC	4.5 to 15VDC
Load current	10mA (Max.)	2A	100mA	16mA

5 PARAMETER SETTINGS

5.1 QD75 Parameter Settings (Comparison of Parameters Between AD71 and QD75)

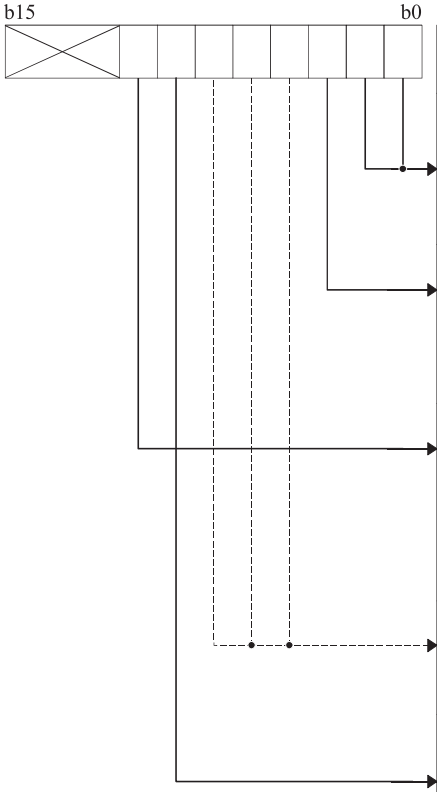
Replace the AD71 parameters with the QD75 parameters.



For details on the QD75 parameters, refer to the following.

📖 Type QD75P/QD75D Positioning Module User's Manual

Parameter information



AD71 Address X/Y 7872/7892	QD75
Unit setting 00: mm 01: inch 10: degree 11: pulse	Pr.1 Unit setting 0: mm 1: inch 2: degree 3: pulse
Rotation direction setting 0: Current value increment with forward run pulse output 1: Current value increment with reverse run pulse output	Pr.6 Rotation direction setting 0: Current value increment with forward run pulse output 1: Current value increment with reverse run pulse output
Pulse output mode 0: pulse + SIGN 1: Forward or reverse pulse	Pr.5 Pulse output mode 0: PULSE/SIGN mode 1: CW/CCW mode 2: A phase/B phase mode (For multiple of 4) 3: A phase/B phase mode (For multiple of 1)
Positioning method 00: Absolute 01: Increment 10: Absolute/increment combined	Positioning method Setting is not required as it is specified with positioning data.
M code ON signal output timing 0: WITH mode 1: AFTER mode	Pr.18 M code ON signal output timing 0: WITH mode 1: AFTER mode

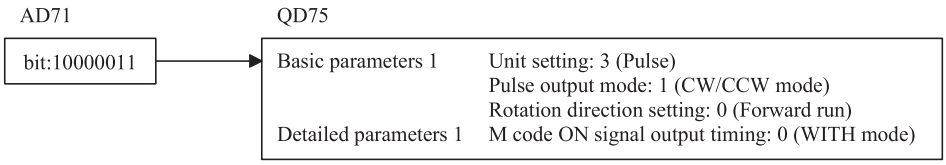
(Example)

Unit setting: pulse

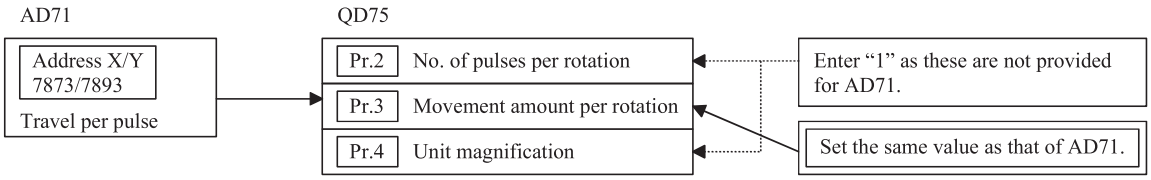
Pulse output mode: CW/CCW mode

Rotation direction setting: Current value increment with forward run pulse output

M code ON signal output timing: WITH mode



Movement amount per pulse/Error compensation



When using the error compensation function of the AD71, refer to the following to set "No. of pulses per rotation", "Movement amount per rotation" and "Unit magnification".

📖 Type QD75P/QD75D Positioning Module User's Manual

Speed limit value, JOG speed limit value, Bias speed at start

The units for the Speed limit value, JOG speed limit value and Bias speed at start of the AD71 and QD75 differ as shown in the following table.

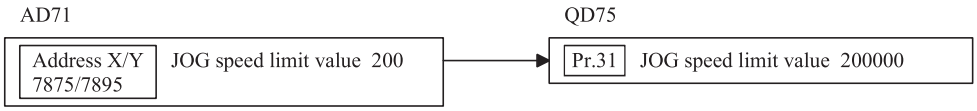
Item	Unit			
	mm	inch	degree	pulse
AD71	× 10^{1} mm/min	× 1 inch/min	× 1 degree/min	× 10^{1} pulse/s
QD75	× 10^{-2} mm/min	× 10^{-3} inch/min	× 10^{-3} degree/min	× 10^{0} pulse/s
Magnification*1	×1000	×1000	×1000	×10

*1 For the QD75, multiply the AD71 value by 1000 for the unit of "mm", "inch" or "degree" or by 10 for "pulse". Correct values when they are set by means other than programs (such as GOT or via Ethernet).

(Example 1)

Unit: mm (inch, degree)

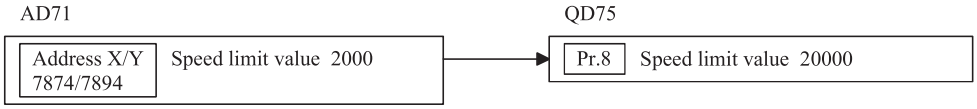
JOG speed limit value: 2000 mm/min



(Example 2)

Unit: pulse

Speed limit value: 20000 pulse/s

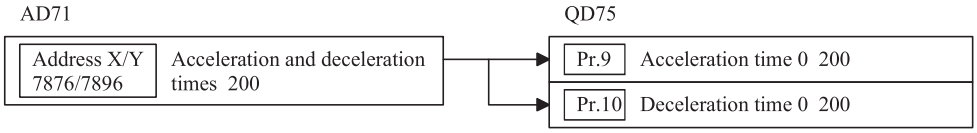


Acceleration and deceleration times

For "Acceleration time 0" and "Deceleration time 0" of the QD75's Basic parameters 2, set the same value as the "Acceleration and deceleration times" of the AD71.

(Example)

Acceleration and deceleration times 200ms

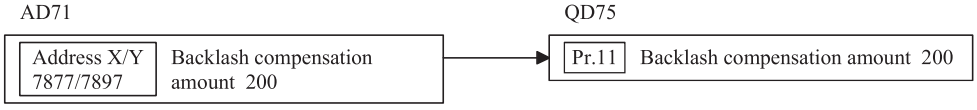


Backlash compensation amount

(Example)

Unit: pulse

Backlash compensation amount: 200

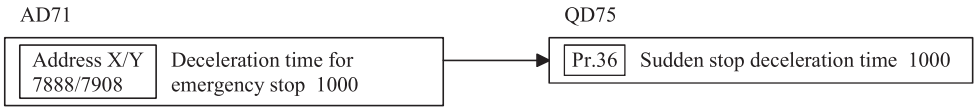


Travel amount per pulse of manual pulse generator

The QD75 does not have the setting item equivalent to "Travel per manual pulse during inching" of the AD71.
Travel amount per pulse of manual pulse generator is determined by the combination of the setting of the axis control data, "[Cd.20] Manual pulse generator 1 pulse input magnification" and other factors. Set it by referring to the following.
📖 Type QD75P/QD75D Positioning Module User's Manual

Emergency stop deceleration time (for AD71S2)

For "[Pr.36] Sudden stop deceleration time" of the QD75's Detailed parameters 2, set the same value as the "Deceleration time for emergency stop" of the AD71S2.
For details, refer to the following.
📖 Type QD75P/QD75D Positioning Module User's Manual

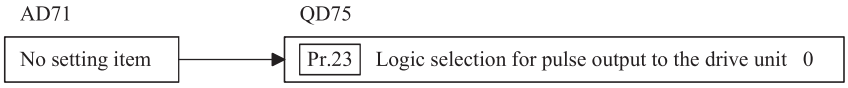


Positioning mode (for AD71S2)

The position control mode, speed/position switching mode and speed control mode are set in the positioning mode of the AD71S2. For the QD75, set the modes by using the positioning identifier of the positioning data.

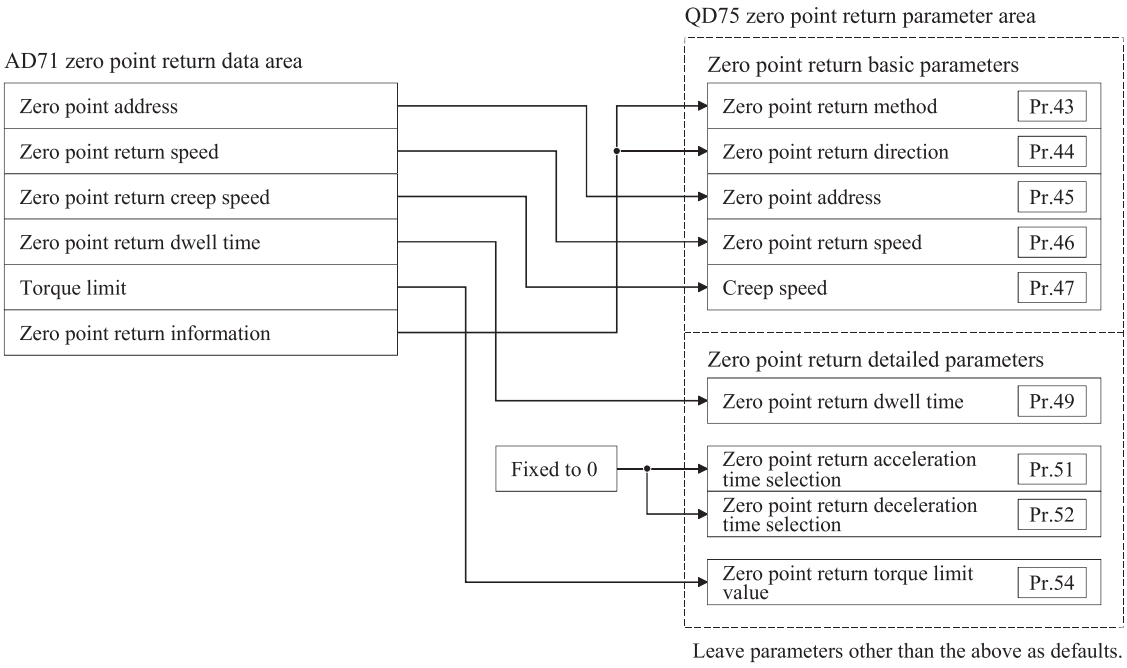
Logic selection for pulse output to the drive unit

No setting item is provided for the AD71 because only negative logic is available for the AD71.
For the QD75, set "Logic selection for pulse output to the drive unit" to "0" to select negative logic.
0: Negative logic
1: Positive logic



5.2 QD75 Zero Point Return Parameter Settings

Replace AD71 zero point return data with QD75 zero point return parameter.



Zero point return speed, Zero point return creep speed

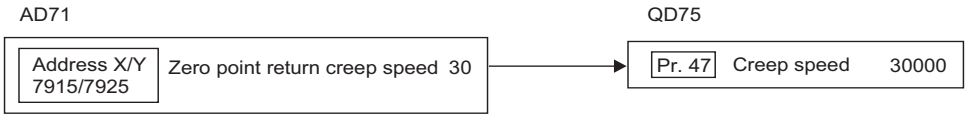
For the QD75, multiply the AD71 value by 1000 for the unit of "mm", "inch" or "degree" or by 10 for "pulse". For the magnification, refer to the following.

☞ Page 13 Speed limit value, JOG speed limit value, Bias speed at start

(Example)

Unit: mm

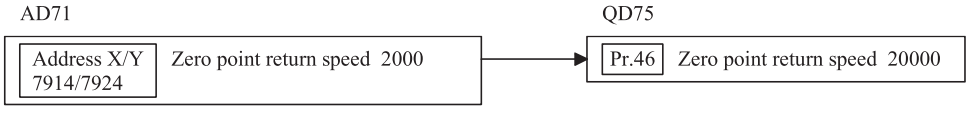
Zero point return creep speed: 300 mm/min



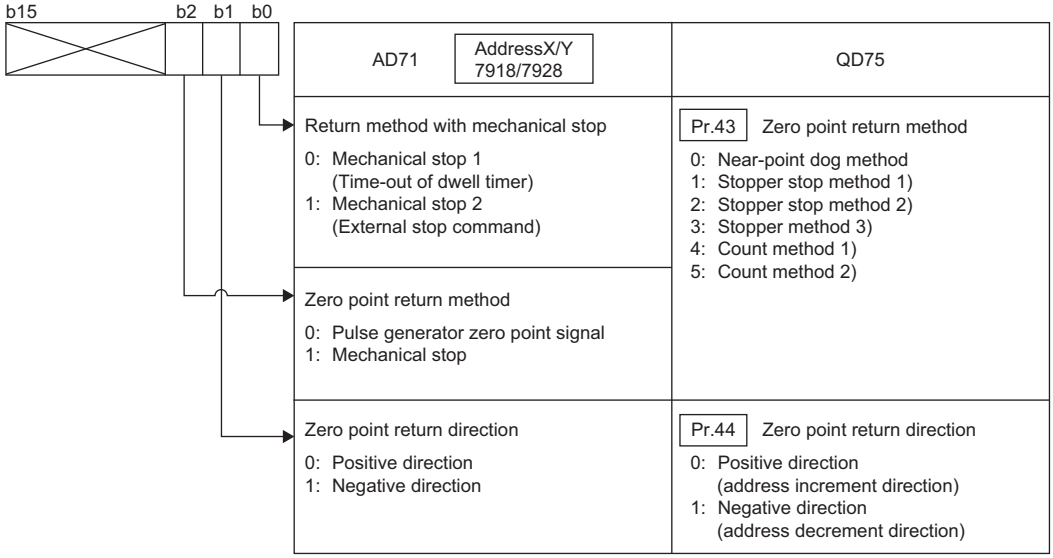
(Example)

Unit: pulse

Zero point return speed: 20000 pulse/s



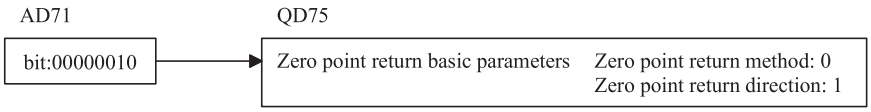
Zero point return information



(Example)

Zero point return method: Pulse generator method

Zero point return direction: Negative direction (Negative direction (address decrement direction))



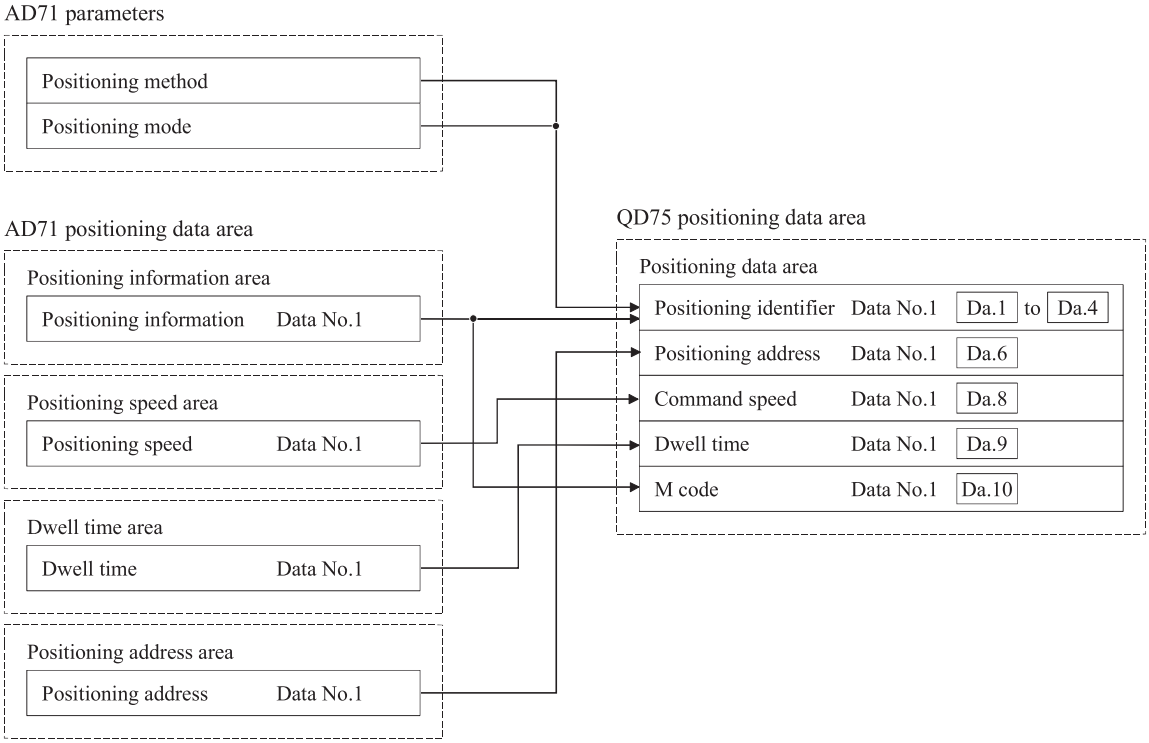
Zero point return acceleration time selection/Zero point return deceleration time selection

These items are required to be set for the QD75 although they are not provided for the AD71. Therefore, to keep the consistency in these values, select the default value "0".

(Setting the default "0" ensures the value of Acceleration/deceleration time for the positioning data are the same.)

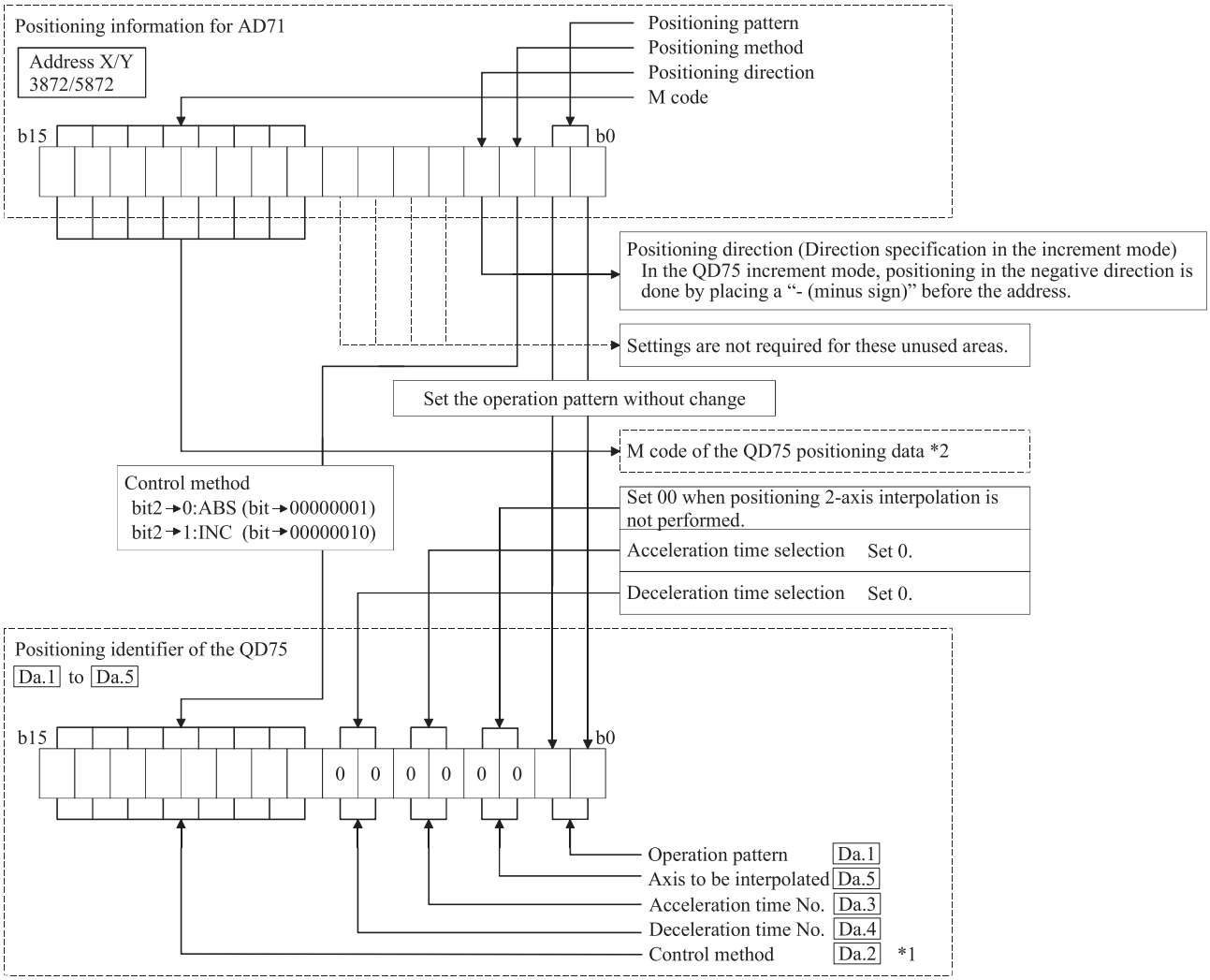
6 POSITIONING DATA SETTINGS

Data configuration of the buffer memory that stores positioning data differs between the AD71 and the QD75. Therefore, refer to the following positioning data configuration, and replace the AD71 positioning data with the QD75 positioning data.
(The data of [Da.5] "Axis to be interpolated" and [Da.7] "Arc address" are omitted from the following QD75 positioning data area.)



Positioning information

Positioning pattern, positioning method, positioning direction and M code

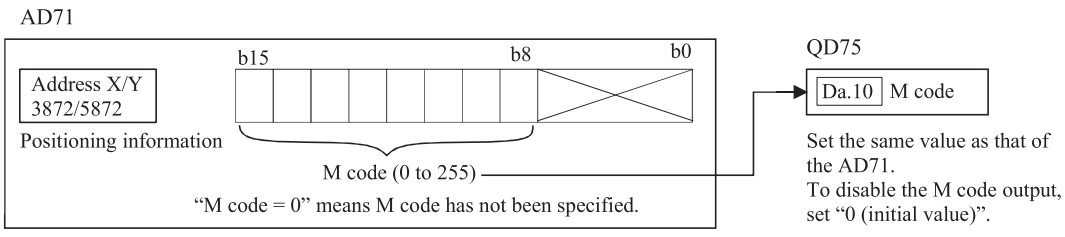


*1 Control method

In the QD75, the positioning control (e.g. linear/circular interpolation), speed control, or speed/position switching control is specified in the control method setting. Control method can be set for each positioning data.

*2 M code

The range of settable values for the QD75 is expanded. Therefore, the values can be set from 0 to 65535.
Setting the same values as values (0 to 255) for the AD71 ensures the control operation of QD75 same as the AD71.



(Example 1)

Positioning pattern: Positioning end

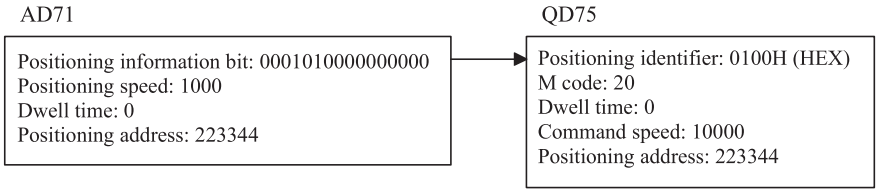
Positioning method: Absolute

M code: 20

Positioning speed: 10000 pulse/s

Dwell time: 0

Positioning address: 223344 pulses



(Example 2)

Positioning pattern: Change speed and continue positioning

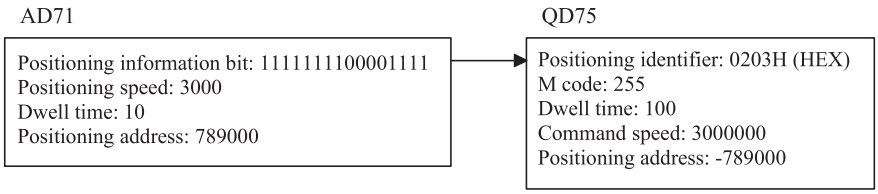
Positioning method: Increment

M code: 255

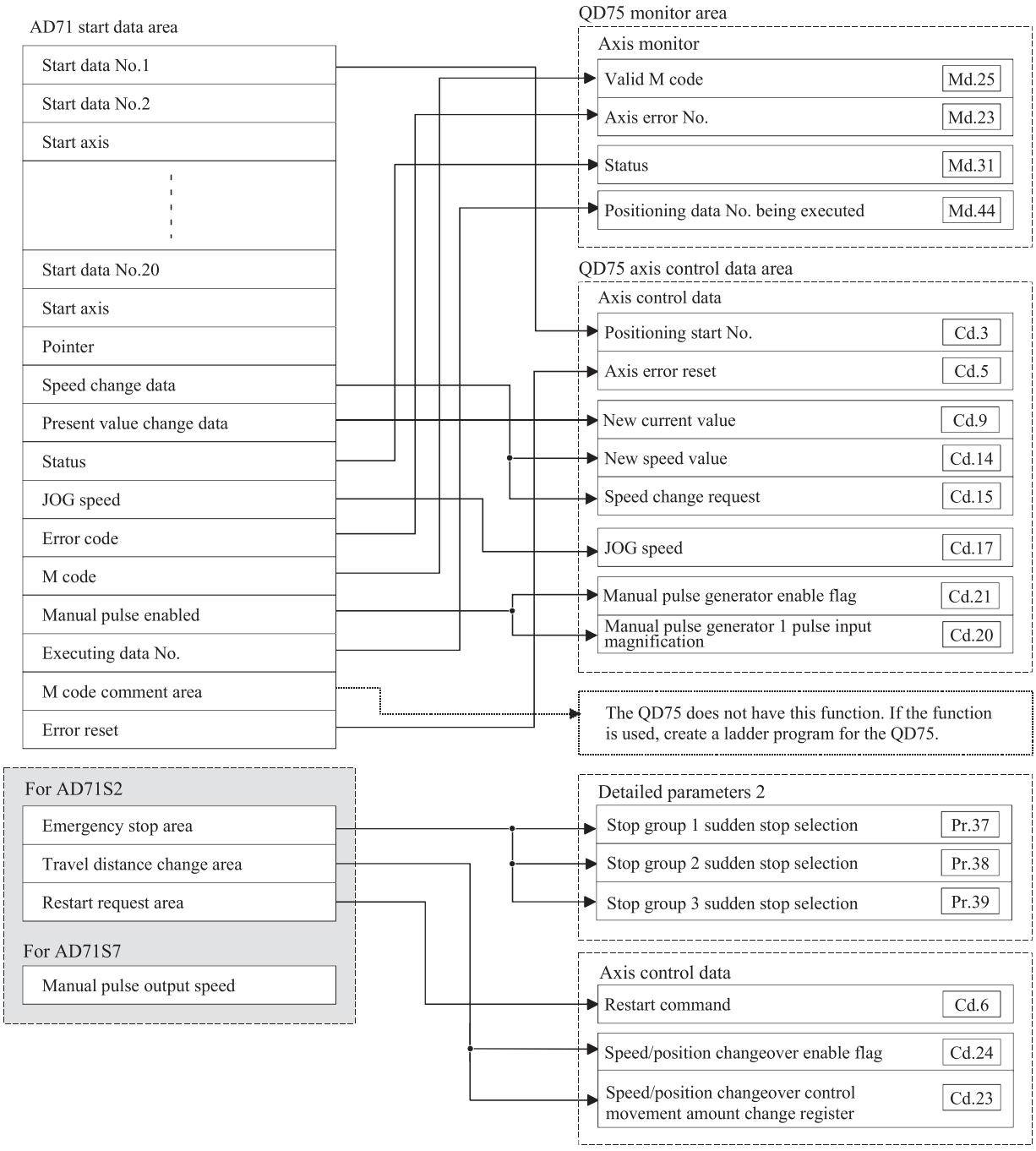
Positioning speed: 30000 mm/min

Dwell time: 100ms

Positioning address: -78900μm



7 DATA FOR POSITIONING CONTROL START

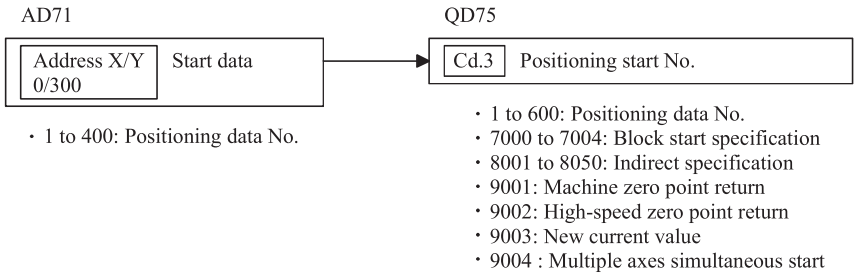


To enable the continuous positioning using the AD71 pointers, use the block start function.
For details, refer to the following.
📖 Type QD75P/QD75D Positioning Module User's Manual

Start data No.

The number of positioning data to be used is set in the [Cd.3] "Positioning start No." of the QD75.

(Setting example)

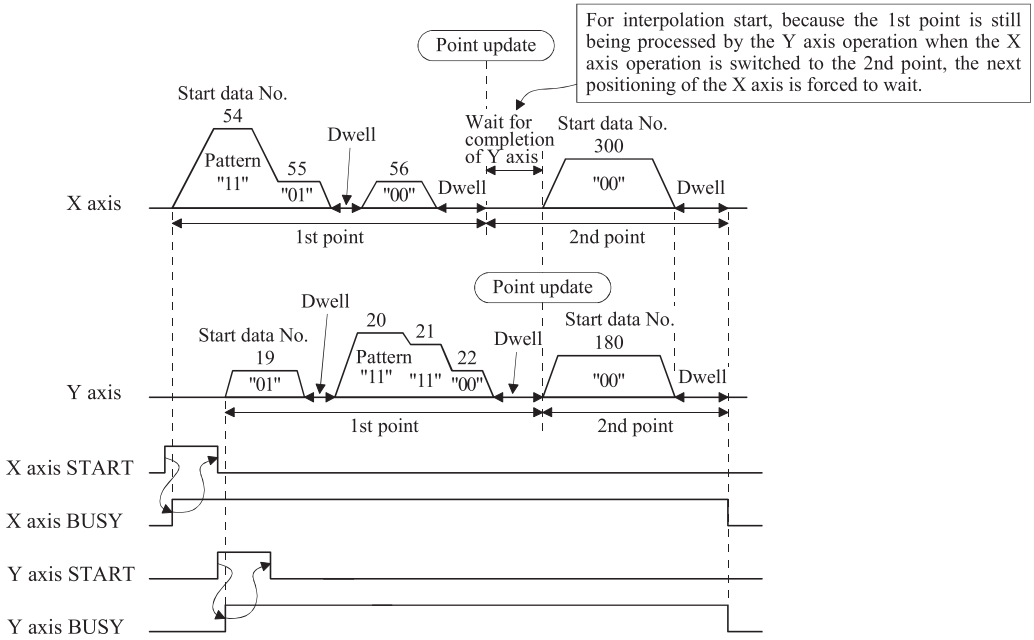


■Precautions

When replacing the AD71 which performs continuous positioning operation using pointers with the QD75, observe precautions below.

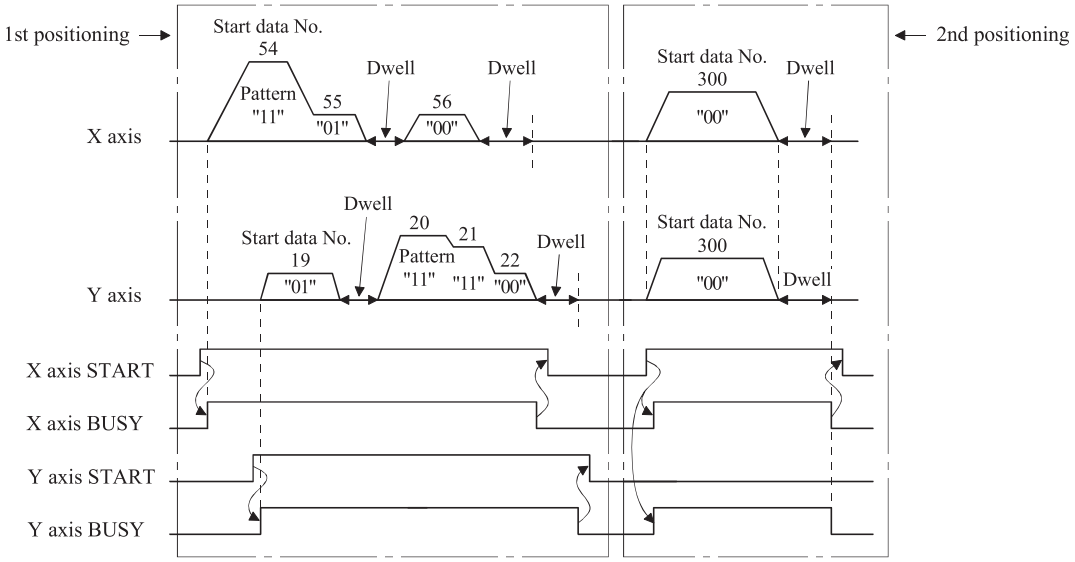
• The AD71 operation

For continuous positioning operation using pointers, when the interpolation start or both-axis start is set for the next point, the AD71 does not execute the next point (interpolation start or both-axis start) until the current positioning of both axes is completed.



• The QD75 operation

The QD75 cannot use the control method of the AD71. (When the interpolation start for X axis is executed while the Y axis is still operating, positioning will stop and an error will occur.) For the QD75, when performing the positioning operation multiple times, perform the positioning start separately for each session as shown below. To do so, create a program where the 2-axis linear interpolation or both-axis start is executed after positioning completion of both axes.



Speed change data

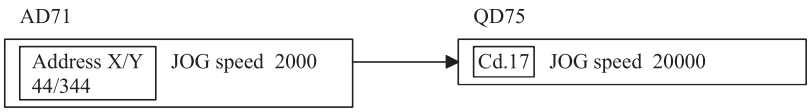
The method of changing speed is different between the AD71 and QD75. To change the speed for the QD75, set a new speed value in the axis control data area and set "1" to the "Speed change request".

Current value change

The method of changing a current value is different between the AD71 and QD75. For the QD75, set a new current value in the axis control data area and set "9003" to the positioning start No. The current value will then change after normal positioning start.

JOG speed

For the QD75, multiply the AD71 value by 1000 for the unit of "mm", "inch" or "degree" or by 10 for "pulse".
Although the JOG start signal (Y□) device No. and the buffer memory address for the JOG speed setting are different between the AD7 and the QD75, the control method is the same.
(Example)
Unit: pulse
JOG speed: 20000 pulse/s



Enabling manual pulse generator

The manual pulse generator enabled function of the AD71 is replaced with [Cd.21] Manual pulse generator enable flag of the QD75.

Error reset

For the AD71, the error reset function (address 201) resets the error for both the X and Y axes simultaneously, while for the QD75 the error reset is set for each axis independently. Therefore, for the QD75, create a program to reset an error for each axis.

Emergency stop area (for AD71S2)

To perform the same operation as the emergency stop function of the AD71S2 for the QD75, set "1: Sudden stop" to both [Pr.38] Stop group 2 sudden stop selection and [Pr.39] Stop group 3 sudden stop selection in the QD75's detailed parameters 2.

- 0: Normal decelerated stop
- 1: Sudden stop

For details, refer to the following.

📖 Type QD75P/QD75D Positioning Module User's Manual

AD71S2 stop factor	Setting on QD75
Emergency stop triggered by external input	• Set the same time value as the AD71S2 deceleration time for emergency stop (address 7888/7908) to [Pr.36] Sudden stop deceleration time. • Set "1: Sudden stop" to [Pr.39] Stop group 3.
Emergency stop triggered by JOG signal OFF	• Set the same time value as the AD71S2 deceleration time for emergency stop (address 7888/7908) to [Pr.28] Deceleration time. • Set "1: Deceleration time 1" to [Pr.33] Jog operation deceleration time selection.

Travel distance change area (for AD71S2)

Set the same value as the one in the AD71S2's travel distance change area to the QD75 [Cd.23] "Speed/position changeover control movement amount change register". Note that different methods are used for the AD71S2 and QD75 to enable the speed/position switching. For the AD71S2, it is enabled by external input, while for the QD75, it is enabled with [Cd.24] Speed/position switching enable flag.

Restart request area (for AD71S2)

The QD75 will resume the positioning from the stopped position to the positioning data end point, when "1" is set in [Cd.6] Restart command. (Turning ON the positioning start signal Y☐ is not required.)

Manual pulse generator output speed (for AD71S7)

The AD71S7 manual pulse generator output speed setting is not available for the QD75.

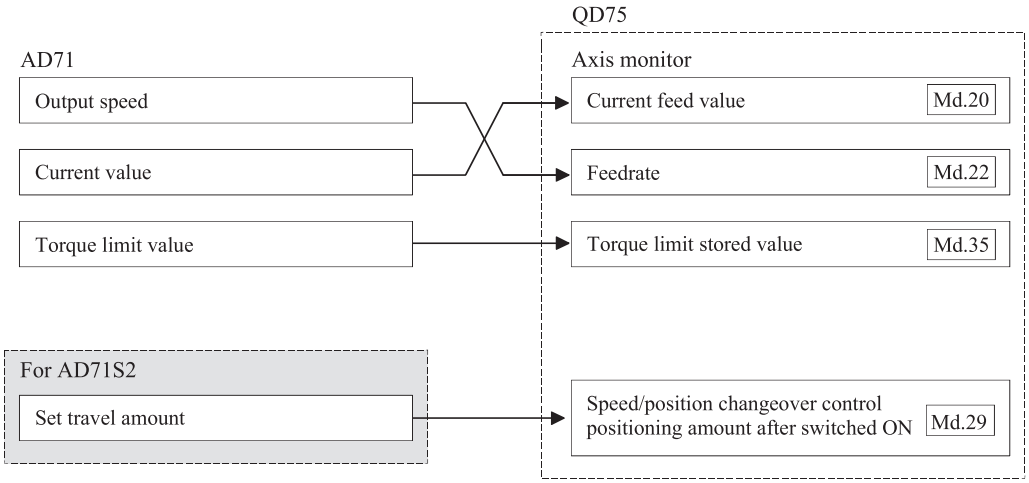
For the QD75, the command output during the manual pulse generator operation is as follows:

[No. of command pulses] = (No. of input pulses of manual pulse generator) × ([Cd.20] Manual pulse generator 1 pulse input magnification)

[Command frequency] = (Manual pulse generator input frequency) × ([Cd.20] Manual pulse generator 1 pulse input magnification)

For the QD75, the speed during the manual pulse generator operation is not limited by [Pr.8] Speed limit value.

8 OS DATA AREAS (INCLUDING MONITOR INFORMATION)



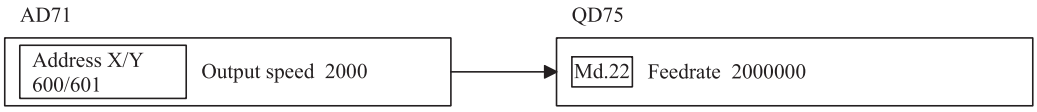
Output speed

For the QD75, a value to be stored is the one obtained by multiplying the AD71 value by 1000 for the unit of "mm", "inch" or "degree" or by 10 for "pulse".

(Example)

Unit: mm

Feed rate: 20000 mm/min

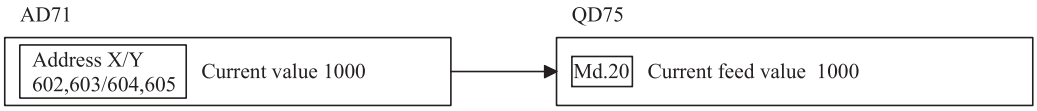


Current value, Torque limit value and Set movement amount

The AD71 and QD75 store the same values.

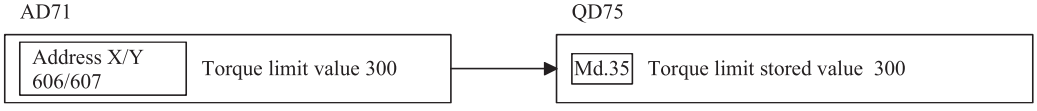
(Example)

Current value: 1000 pulses



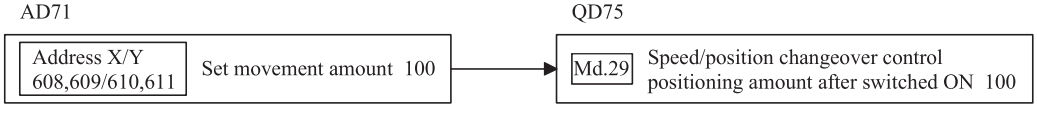
(Example)

Torque limit value: 300%



(Example)

Set movement amount: 100 pulses



9 POSITIONING CONTROL PROGRAMS

9.1 Differences in I/O Signals

AD71	QD75
Watchdog timer error (X0)	No watchdog timer error signal is provided. When a watchdog timer error occurs, QD75 Ready (X0) turns OFF.
Zero point return request (X6, X7)	The status can be checked in [Md.31] Zero point return request flag (Bit 3). "1" is set, when the zero point return is requested.
Battery error (XA)	No battery error signal is provided. For the QD75, batteries are not required for memory backup because data is stored in the flash ROM.
Error detection (XB) Common to both X axis and Y axis	Error detection can be performed for each axis independently. Axis 1: X8, Axis 2: X9, Axis 3: XA, Axis 4: XB
Zero point return complete (XC, XD)	The status can be checked in [Md.31] Zero point return complete flag (Bit 4). "1" is set, when the zero point return is completed.
Interpolation positioning start (Y12)	No interpolation start signal is provided. For the QD75, interpolation operation is started by setting interpolation to positioning data and executing positioning start.
Zero point return start (Y13, Y14)	No zero point return start signal is provided. For the QD75, writing "9001" to [Cd.3] Positioning start No. and starting positioning will execute zero point return.
M code OFF (Y1B, Y1C)	[Cd.7] M code OFF request is used. Writing "1" turns M code OFF.

For details on the QD75 I/O signals, refer to the following.

Type QD75P/QD75D Positioning Module User's Manual

9.2 Precautions for Replacing AD71 with QD75

When programming, pay attention to the fact that the QD75 is different from the AD71 in I/O numbers for I/O signals and buffer memory addresses. Precautions for other than these differences are shown below.

Item		AD71	QD75	Points for replacement
Setup	Programmable controller ready	Y1D is turned ON with the program.	Y0 is turned ON with the program.	—
	Ready status confirmation	When AD71 is ready, X1 is turned ON.	When QD75 is ready, X0 is turned ON.	—
JOG operation		Turning ON or OFF the forward/ reverse JOG start (Y☐) starts or stops JOG operation accordingly.		—
Zero point return		Zero point return is started when the zero point return signal (Y☐) is turned ON for each axis. The operation depends on parameter setting of zero point return data.	The same method as positioning start is used (program). Writing "9001" to [Cd.3] Positioning start No. and turning ON the positioning start signal (Y☐) starts zero point return. The operation depends on parameter setting of zero point return data.	There is no zero point return signal (Y☐) for QD75. Writing "9001" to [Cd.3] Positioning start No. and turning ON the positioning start signal (Y☐) starts zero point return.
Positioning operation		Positioning is started by writing the positioning data No. to the start data No. area in the buffer memory, and turning ON the start signal (Y☐) for each axis. The start signal (Y☐) for interpolation is provided separately.	Positioning is started by writing the positioning data No. to [Cd.3] "Positioning start No." in the buffer memory, and then turning ON the start signal (Y☐) for each axis. Also, as the QD75 does not have an interpolation start signal (Y☐) same as AD71, interpolation operation has to be set in the positioning data.	To start interpolation, the operation must be specified in the positioning data.
Speed change		Write a new speed value in the speed change data area (buffer memory address 40/340).	Write a new speed value to [Cd.14] "New speed value" in the buffer memory and set "1" to [Cd.15] Speed change request.	Setting "1" in [Cd.15] "Speed change request" is required to execute this function.
Current value change		Write data for a new current value in the current value change data area (buffer memory address 41, 42/341, 342).	Write data for a new current value to [Cd.9] "New current value" in the buffer memory and "9003" to [Cd.3] "Positioning start No." and then, turn ON the positioning start signal (Y☐).	Writing "9003" to [Cd.3] "Positioning start No." and turning ON the positioning start signal (Y☐) is required.

Item	AD71	QD75	Points for replacement
Restart	If positioning stops temporarily, turn ON the positioning start signal (Y☐) to restart. However, positioning cannot be restarted in the increment system. In the absolute system, positioning can be restarted if its positioning data No. is same as the one when the operation stopped. When the operation stops unexpectedly during the control switch in the speed/ positioning control switching mode, set "1" to Restart area (Buffer memory address: 205/505) and turn ON the positioning start signal (Y☐) to restart the operation.	Setting "1" to [Cd.6] "Restart command" after a temporary stop restarts the positioning. For the absolute and increment systems, the restart command can be used. In the absolute system, when the operation stops, set the positioning data No. same as the one when operation stopped to [Cd.3] "Positioning start No." and turn ON the positioning start signal (Y☐) to restart positioning.	Setting "1" to [Cd.6] "Restart command" restarts positioning in the QD75.
Data backup method	Contents of the buffer memory are always backed up using a battery. The operation after power-on or programmable controller CPU reset is based on the backed-up memory data.	Parameters, positioning data, and block start data in the buffer memory are written to flash ROM for backup by setting "1" to [Cd.1] Flash ROM write request. (The No. of flash ROM write: Up to 100000) At the time of power-on or programmable controller CPU reset, the flash ROM data are transferred to the buffer memory and the module operates with those data. (📖 Type QD75P/QD75D Positioning Module User's Manual) However, if the data has been written to the buffer memory with the program at the time of power-on or programmable controller CPU reset, the data written with the program will be valid because the program data overwrites the data transferred from the flash ROM.	To back up data, "1" must be set in [Cd.1] "Flash ROM write request". The max number of flash ROM writes is 100000 times.

9.3 Programming Restrictions

Reading/writing the data

We recommend setting the data described in this chapter (various parameters, positioning data, block start data) by using GX Works2.
Setting the data with program requires a large number of programs and devices, and thus programs become more complicated and the scan time increases.
When rewriting the positioning data during continuous path control or continuous positioning control, rewrite it before the execution of data four items before.
If the positioning data is not rewritten before the execution of data four items before, the process will be carried out with the data before the rewrite.

Restrictions on speed change intervals

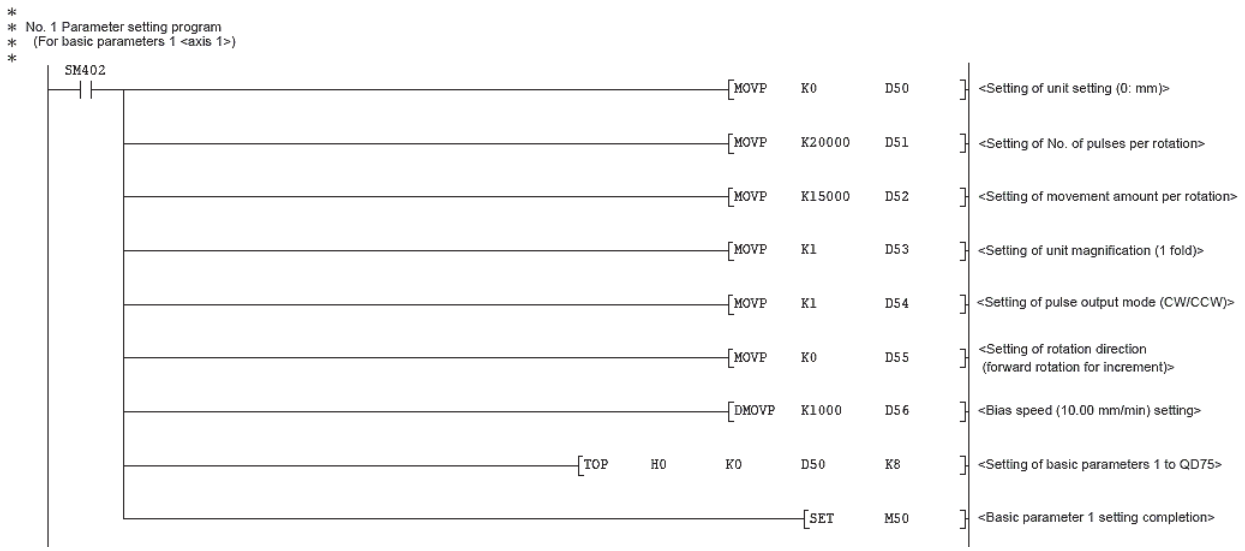
For the QD75, the speed change must be executed in intervals of 100ms or more.

9.4 Program Examples for QD75

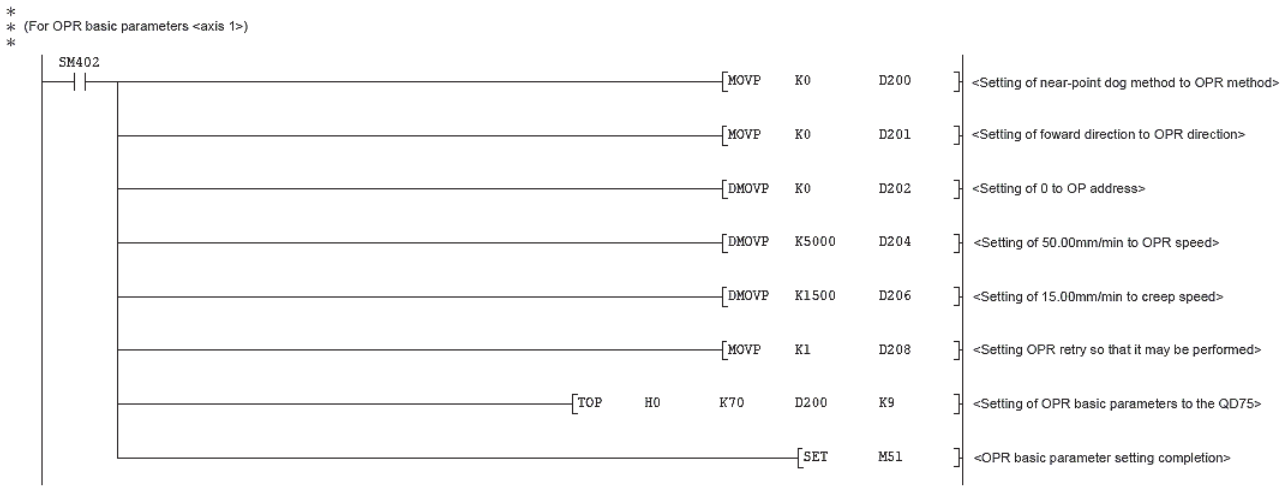
This section provides some basic program examples for the QD75 positioning control. When creating programs for the QD75, refer to the following examples and compare them with those in the AD71.
(The program examples represent the case in which the QD75 is mounted in slot 0 of the main base unit.)
To perform controls other than those shown as the examples, refer to the following.
📖 Type QD75P/QD75D Positioning Module User's Manual
When using GX Works2 to create data, the following parameter setting program and the positioning data setting program are not required.

Parameter settings

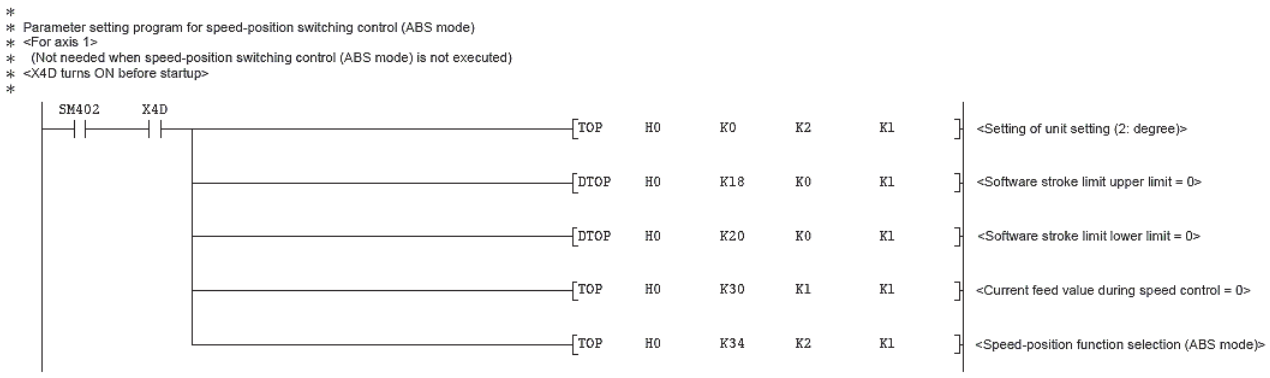
■Basic parameters setting



■OPR parameters setting



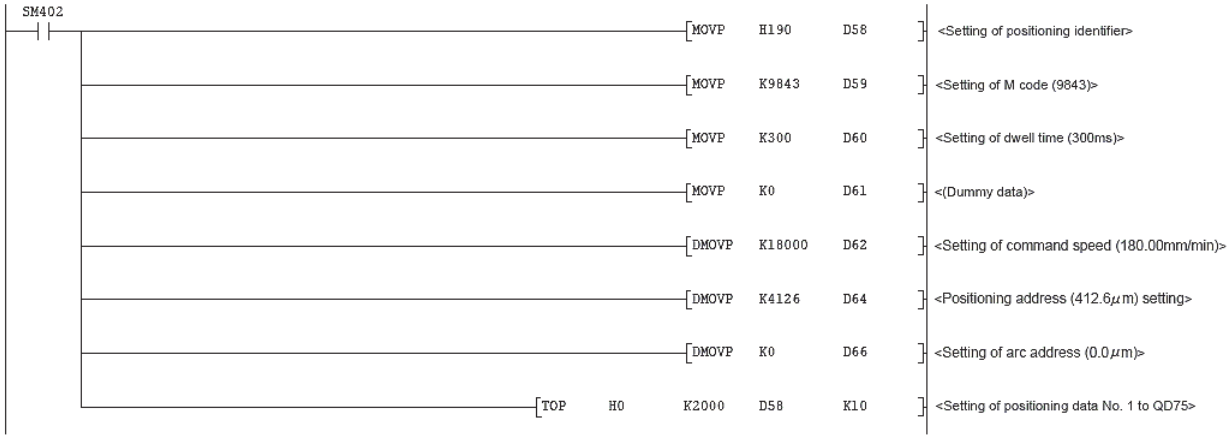
■Speed-position switching control parameters setting (only when speed-position switching control function is used)



Positioning data setting

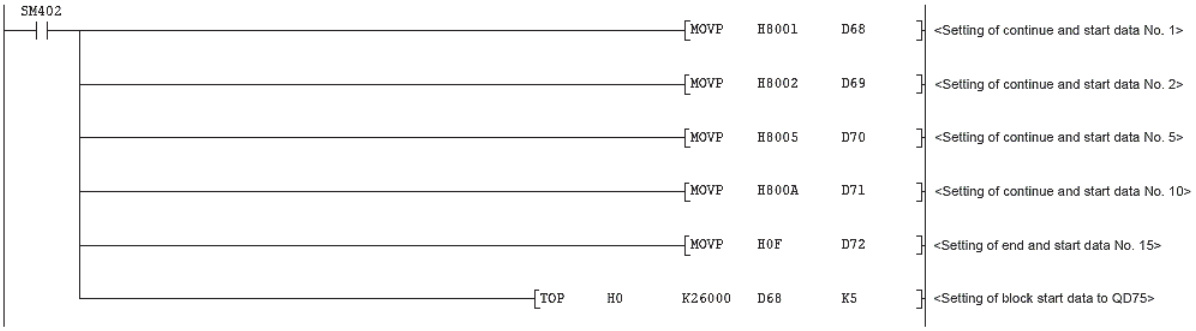
■Positioning data setting

```
*
* No. 2 Positioning data setting program
*   (For positioning data No. 1 <axis 1>)
*   <Positioning identifier>
*       Operation pattern: Positioning complete
*       Control system: 1-axis linear control (ABS)
*       Acceleration time No.: 1, deceleration time No. 2
*
```



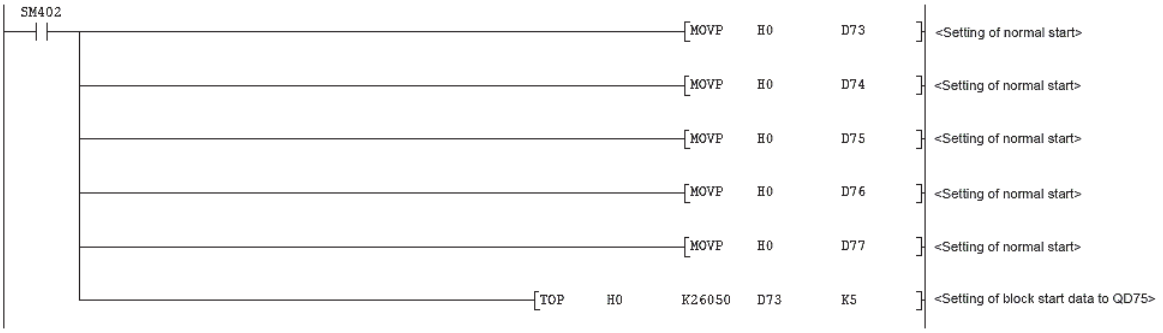
■Block start data setting (only when block start function is used)

```
*
* No. 3 Block start data setting program
*   Block start data of start block 0 (axis 1)
*   For setting of points 1 to 5
*       (Conditions)
*         Shape: Continued at points 1 to 4, ended at point 5
*         Special start instruction: Normal start at all of points 1 to 5
*         <Positioning data are already preset>
*
*
*       [Setting of shape and start data No.]
*
```

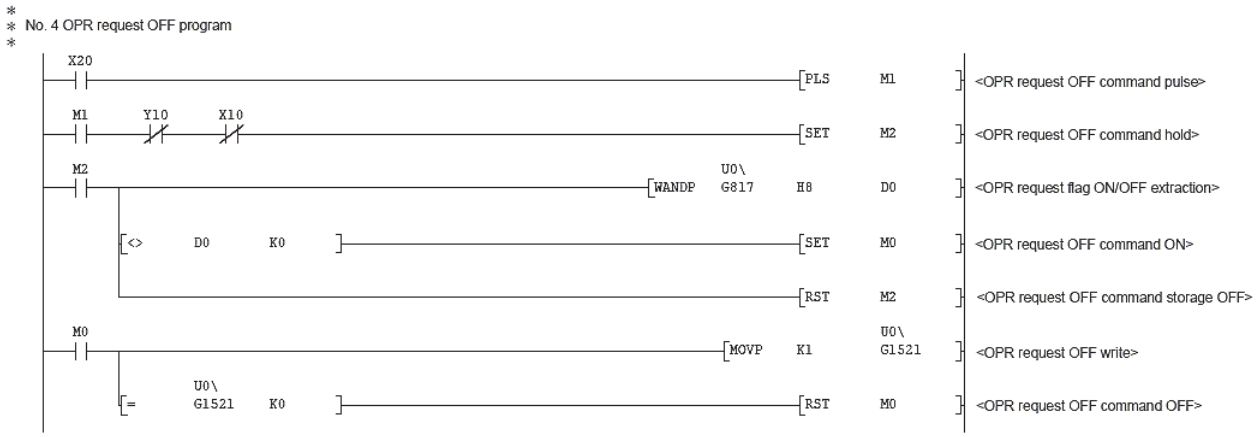


■Special start instruction data setting (only when special start instruction function is used)

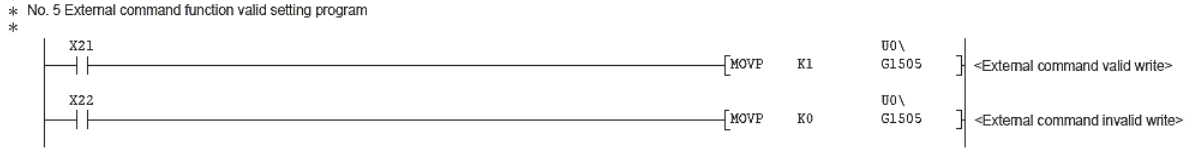
```
*
* [Setting of special start instruction to normal start]
*
```



■OPR request OFF (only when OPR is not executed)



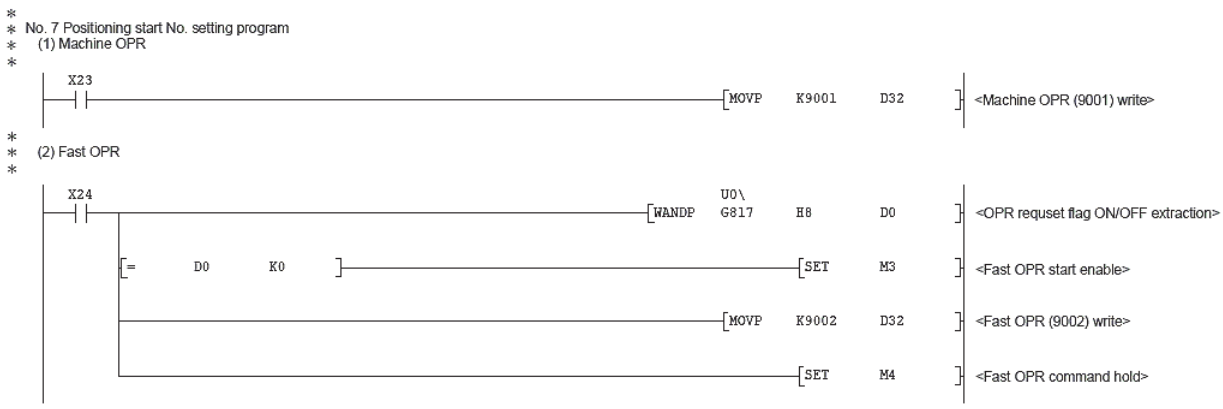
■External command function valid setting (only when external command function is used)



■Programmable controller READY signal ON

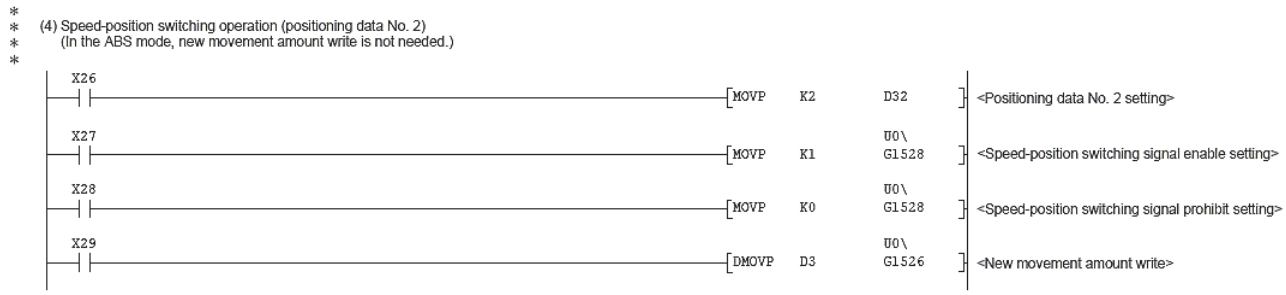
Positioning start No. setting

■OPR

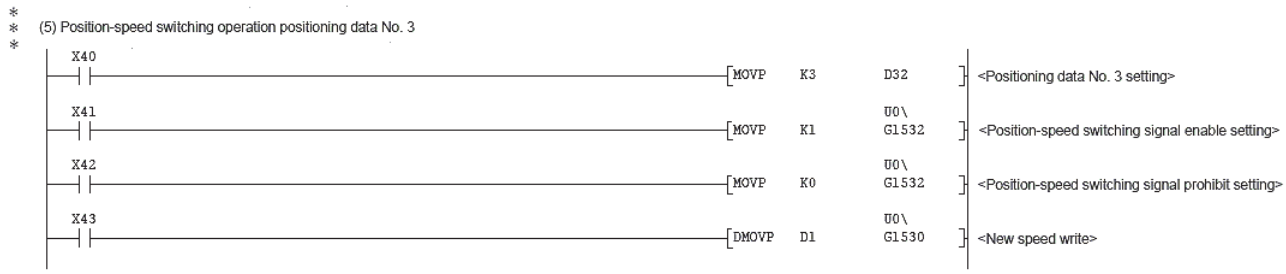


■Positioning start data No. setting

■Speed-position switching operation start data No. setting (only when speed-position switching operation function is used)

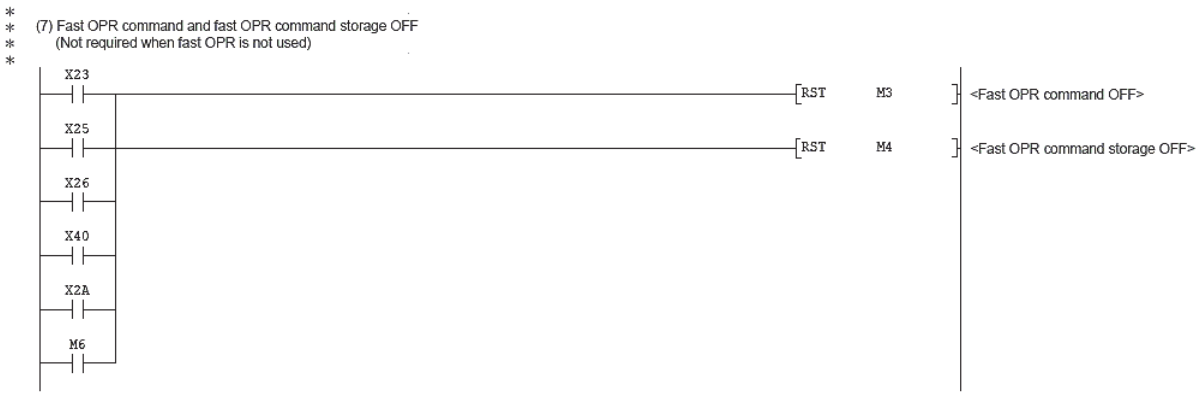


■Position-speed switching operation start data No. setting (QD75 additional function)



■High-level positioning control (only when block positioning start function is used)

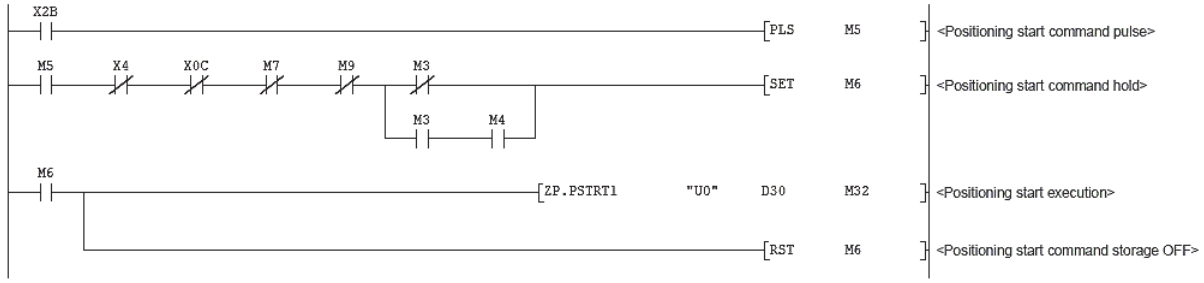
■Fast OPR command OFF (only when fast OPR function is used)



Positioning start

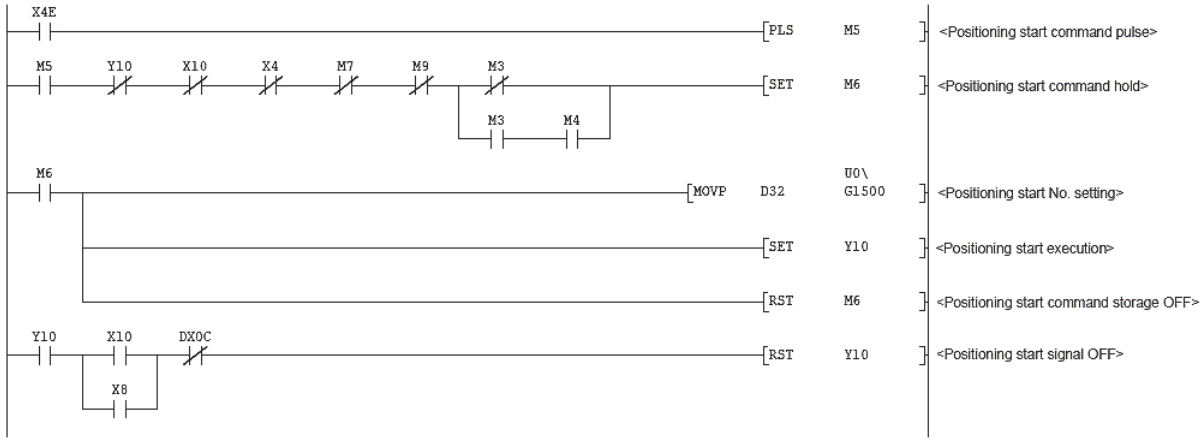
■Start using dedicated instruction

```
*
*  No. 8 Positioning start program
*    (1) When dedicated instruction (PSTRT1) is used
*        (When fast OPR is not made, contacts of M3 and M4 are not needed.)
*        (When M code is not used, contact of X04 is not needed.)
*        (When JOG operation/inching operation is not performed, contact of M7 is not needed.)
*        (When manual pulse generator operation is not performed, contact of M9 is not needed.)
*
```



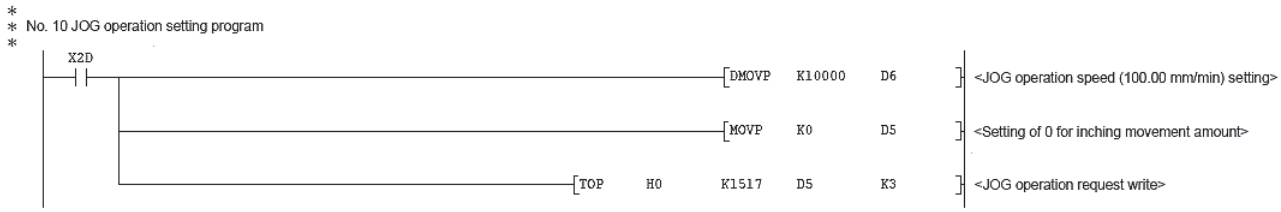
■Start using positioning start signal

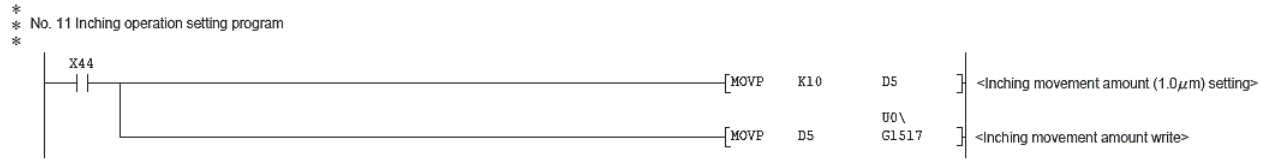
```
*
*    (2) When positioning start signal (Y10) is used
*        (When fast OPR is not made, contacts of M3 and M4 are not needed.)
*        (When M code is not used, contact of X04 is not needed.)
*        (When JOG operation/inching operation is not performed, contact of M7 is not needed.)
*        (When manual pulse generator operation is not performed, contact of M9 is not needed.)
*
```

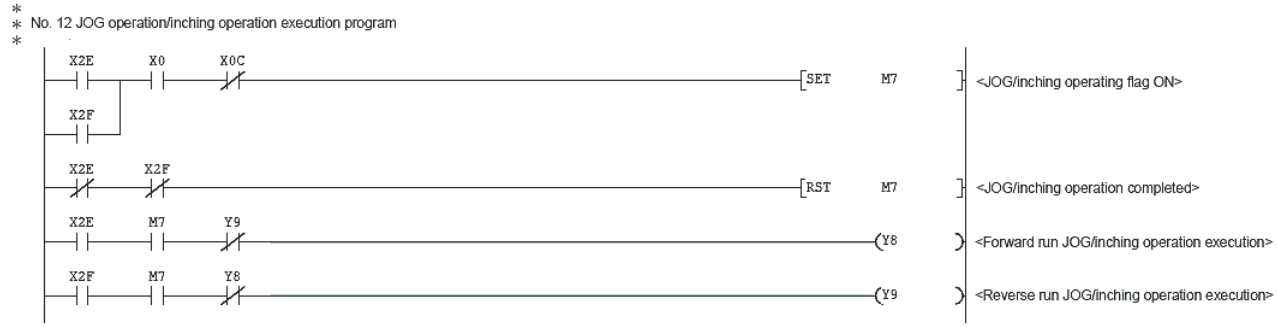


■M code OFF (only when M code is used)

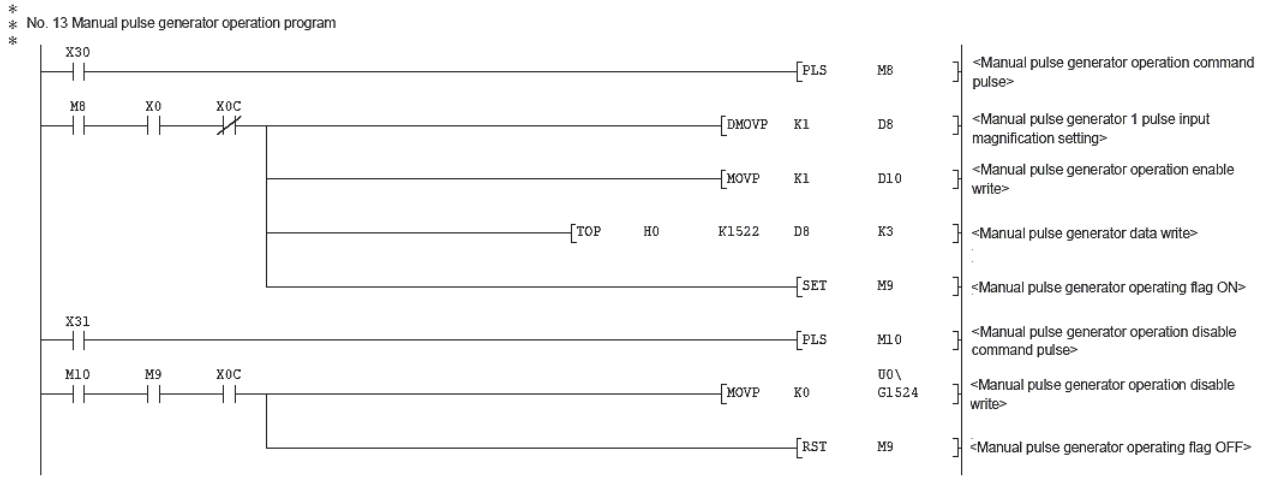
■JOG operation and inching operation (QD75 additional function) setting and start



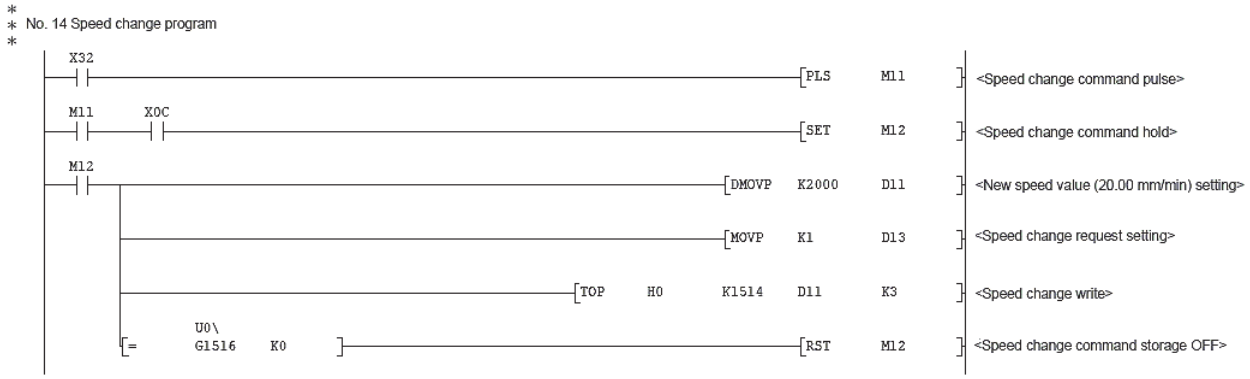




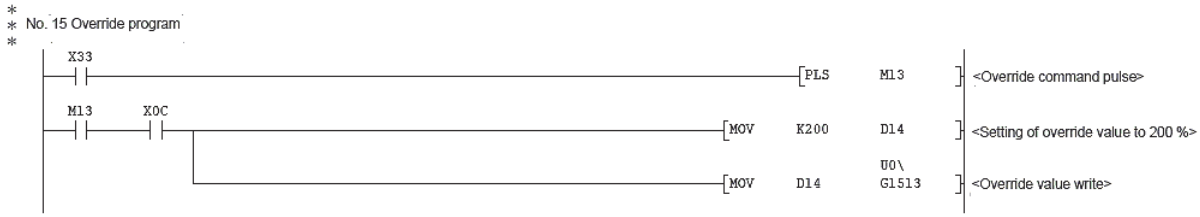
■Manual pulse generator operation (only when manual pulse generator is used)



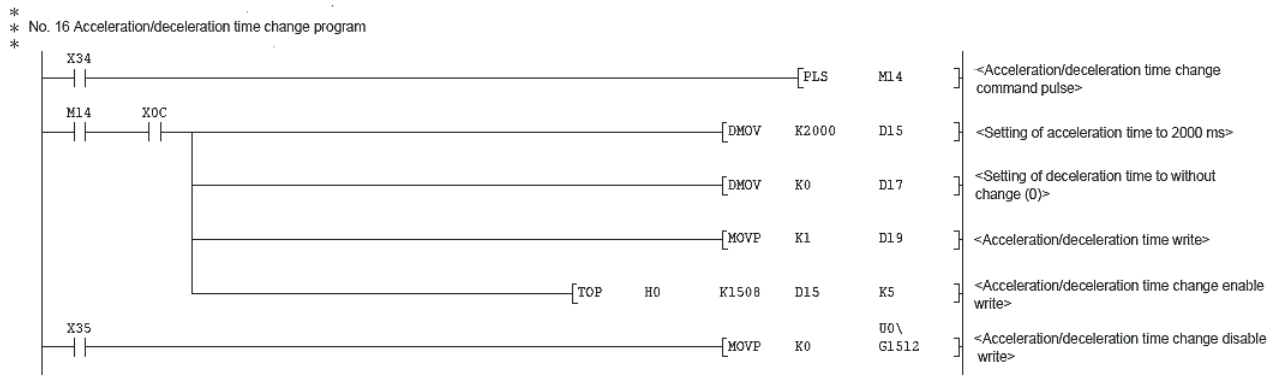
■Speed change using new speed value



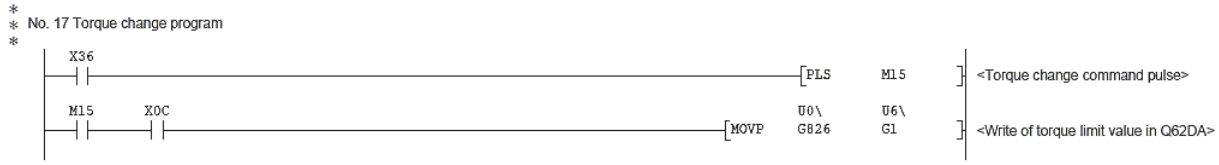
■Speed change using override function (QD75 additional function)



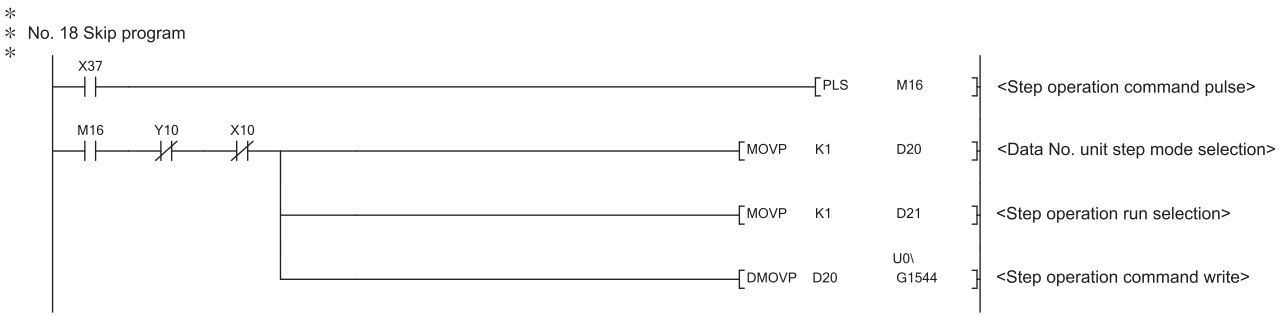
■Acceleration or deceleration time change (QD75 additional function)



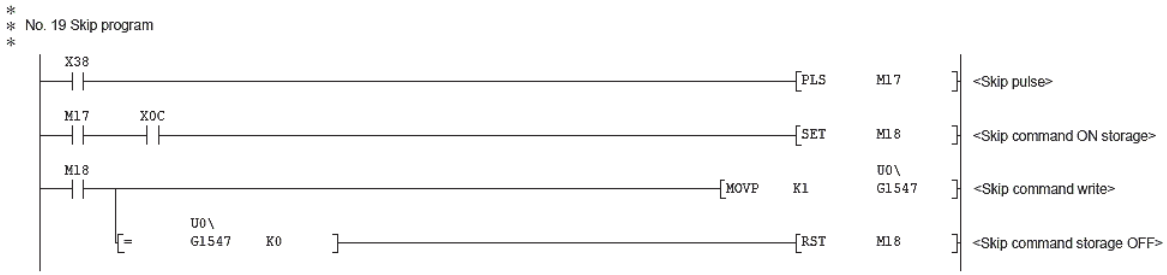
■Torque change (only when torque control function is used)



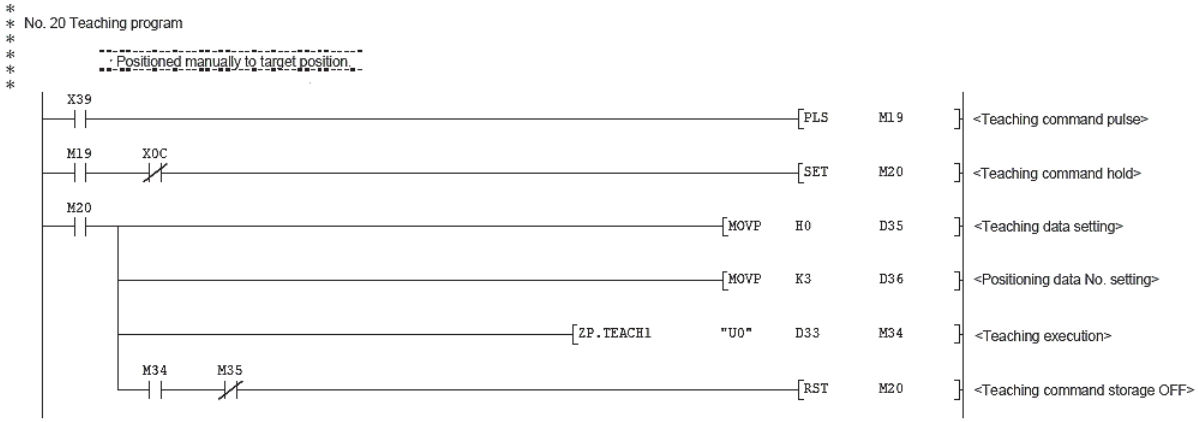
■Step operation (QD75 additional function)



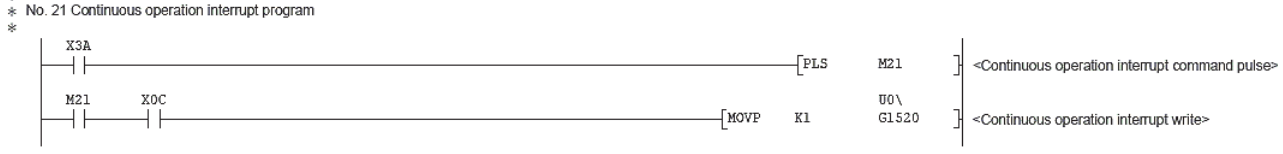
■Skip (QD75 additional function)



■Manual operation (teaching) positioning (QD75 additional function)



■Continuous operation interrupt



■Target position change (QD75 additional function)

```
*
* No. 22 Target position change program
*
 X45                                                    PLS    M30    <Target position change command pulse>
 M30     X0C                                            SET    M31    <Target position change command hold>
 M31                                                    DMOVP  K3000  D23    <Setting of target position address to 300.0μm>
                                                        DMOVP  K0     D25
                                                        MOVP   K1     D27    <Target position change request setting>
                                                  TOP   H0     K1534  D23    K5    <Speed change write>
         U0\
         G1538   K0                                     RST    M31    <Speed change request storage OFF>
```

■Absolute position restoration (QD75 additional function)

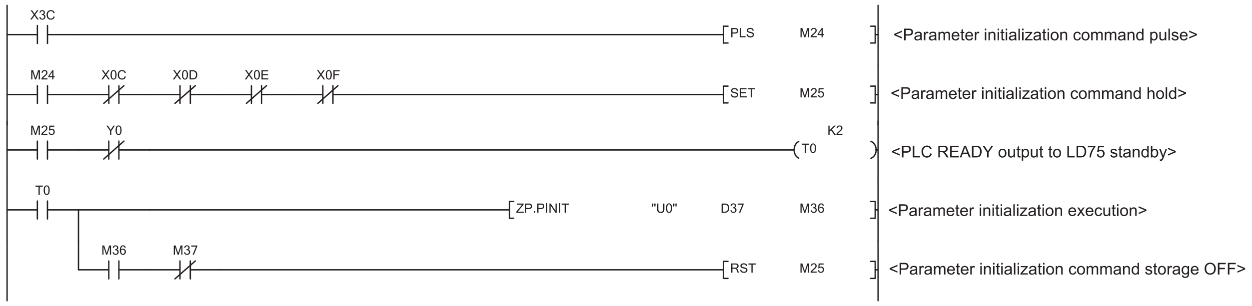
```
*
* No. 23 Absolute position restoration program
*   (1) Absolute position restoration command acceptance
*
 SM400                                                  PLS    M40
 M40     X0                                             SET    M41
                                                  FMOV  K0     D42    K4    <D42 to D45 reset>
*
*   (2) Setting of transmit data to servo-amplifier and confirmation of absolute position restoration completion
*       ABRST1 instruction completed when M42 is ON and M43 is OFF.
*       Absolute position data restoration completed when status = 0.
*
 M42     M43                                            MOV    D44    K1Y50
 M43                                                    MOV    D42    D49    <Error code transmission to D49>
         D45     K0                                     RST    M41
*
*   (3) ABS data setting and ABRST1 instruction execution
*
 M41     X47                                            (D43.0 )    <ABS data bit 0 ON/OFF>
         X48                                            (D43.1 )    <ABS data bit 1 ON/OFF>
         X49                                            (D43.2 )    <Transmission data preparation complete flag ON/OFF>
                                            Z.ABRST1  "U0"  D41    M42    <ABRST1 instruction execution>
```

■Restart after positioning stop

```
*
* No. 24 Restart program
*
 X3B                                                    PLS    M22    <Restart command pulse>
 M22     U0\
         G809    K1                                     SET    M23    <Restart command ON during stop>
 M23     X14     X10                                    MOVP   K1     U0\G1503    <Restart request write>
                 U0\
                 G1503   K0                             RST    M23    <Restart command storage OFF>
```

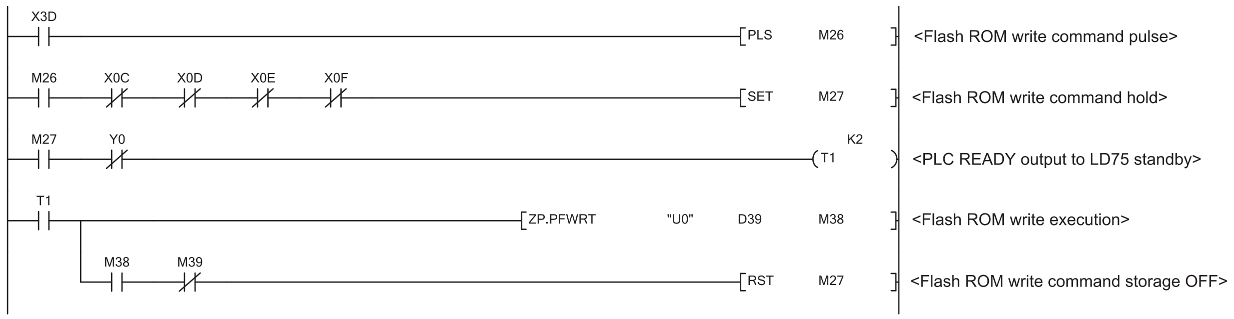
■Parameter initialization

*
* No. 25 Parameter initialization program
*



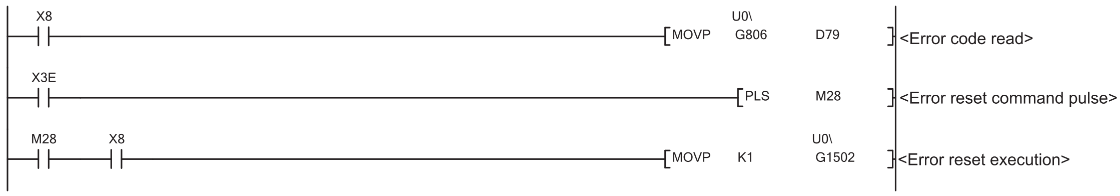
■Flash ROM write

*
* No. 26 Flash ROM write program
*



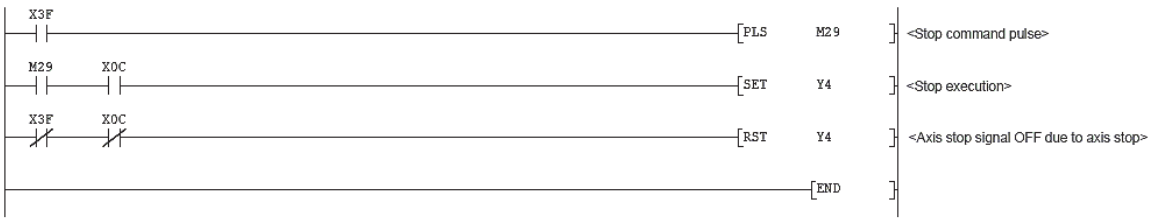
■Error reset

*
* No. 27 Error reset program
*



■Axis stop

*
* No. 28 Stop program
*



10 QD75 TEST OPERATION

When the connection of the relevant signals, and the creation of programs for positioning control are completed, perform a test operation for start-up of the positioning system using the QD75.

LED display check on QD75 module

Turn on the programmable controller and check the following LED display on the QD75 module when the program runs.

- On, off, or flashing of RUN indicator LED, ERR indicator LED, and Axis display LED indicate the module states. For details, refer to the following.

📖 Type QD75P/QD75D Positioning Module User's Manual

- When an error occurs, check the error details with the [Md.9] Axis in which the error occurred and the [Md.10] Axis error No. and eliminate the error factor.

"Ready ON" and "Servo ON" check

After confirming the QD75 has started normally, turn on the programmable controller READY signal, power on the servo amplifier and check that the servo amplifier has started up without any error.

Operation check by JOG operation

Perform the JOG operation using the JOG operation program of the positioning control programs, and check that the motor functions correctly according to the commands set.
Normal JOG operation indicates that the control of the QD75 and the driver (servo amplifier) is normal.

Operation check of positioning system

Start the programs for zero point return and positioning and check that the control operation is normally performed.

11 LISTS OF QD75 BUFFER MEMORY ADDRESSES

The QD75 buffer memory addresses are listed below. (Do not use any address other than listed below. If used, the system may not operate correctly.)

11.1 Parameters [Pr.]

Positioning parameters

Basic parameters 1

Buffer memory address				Item
Axis 1	Axis 2	Axis 3	Axis 4	
0	150	300	450	[Pr.1] Unit setting
1	151	301	451	[Pr.2] No. of pulses per rotation (Ap)
2	152	302	452	[Pr.3] Movement amount per rotation (Al)
3	153	303	453	[Pr.4] Unit magnification (Am)
4	154	304	454	[Pr.5] Pulse output mode
5	155	305	455	[Pr.6] Rotation direction setting
6 7	156 157	306 307	456 457	[Pr.7] Bias speed at start
8 9	158 159	308 309	458 459	Use prohibited

Basic parameters 2

Buffer memory address				Item
Axis 1	Axis 2	Axis 3	Axis 4	
10 11	160 161	310 311	460 461	[Pr.8] Speed limit value
12 13	162 163	312 313	462 463	[Pr.9] Acceleration time 0
14 15	164 165	314 315	464 465	[Pr.10] Deceleration time 0

Detailed parameters 1

Buffer memory address				Item
Axis 1	Axis 2	Axis 3	Axis 4	
17	167	317	467	[Pr.11] Backlash compensation amount
18 19	168 169	318 319	468 469	[Pr.12] Software stroke limit upper limit value
20 21	170 171	320 321	470 471	[Pr.13] Software stroke limit lower limit value
22	172	322	472	[Pr.14] Software stroke limit selection
23	173	323	473	[Pr.15] Software stroke limit valid/invalid selection
24 25	174 175	324 325	474 475	[Pr.16] Command in-position width
26	176	326	476	[Pr.17] Torque limit setting value
27	177	327	477	[Pr.18] M code ON signal output timing
28	178	328	478	[Pr.19] Speed switching mode
29	179	329	479	[Pr.20] Interpolation speed designation method
30	180	330	480	[Pr.21] Current feed value during speed control
31	181	331	481	[Pr.22] Input signal logic selection
32	182	332	482	[Pr.23] Output signal logic selection
33	—	—	—	[Pr.24] Manual pulse generator input selection
34	184	334	484	[Pr.150] Speed-position function selection
35	185	335	485	Use prohibited
140	—	—	—	[Pr.70] Positioning option valid/invalid setting

Detailed parameters 2

Buffer memory address				Item
Axis 1	Axis 2	Axis 3	Axis 4	
36 37	186 187	336 337	486 487	[Pr.25] Acceleration time 1
38 39	188 189	338 339	488 489	[Pr.26] Acceleration time 2
40 41	190 191	340 341	490 491	[Pr.27] Acceleration time 3
42 43	192 193	342 343	492 493	[Pr.28] Deceleration time 1
44 45	194 195	344 345	494 495	[Pr.29] Deceleration time 2
46 47	196 197	346 347	496 497	[Pr.30] Deceleration time 3
48 49	198 199	348 349	498 499	[Pr.31] JOG speed limit value
50	200	350	500	[Pr.32] JOG operation acceleration time selection
51	201	351	501	[Pr.33] JOG operation deceleration time selection
52	202	352	502	[Pr.34] Acceleration/deceleration process selection
53	203	353	503	[Pr.35] S-curve ratio
54 55	204 205	354 355	504 505	[Pr.36] Sudden stop deceleration time
56	206	356	506	[Pr.37] Stop group 1 sudden stop selection
57	207	357	507	[Pr.38] Stop group 2 sudden stop selection
58	208	358	508	[Pr.39] Stop group 3 sudden stop selection
59	209	359	509	[Pr.40] Positioning complete signal output time
60 61	210 211	360 361	510 511	[Pr.41] Allowable circular interpolation error width
62	212	362	512	[Pr.42] External command function selection

OPR parameters

OPR basic parameters

Buffer memory address				Item
Axis 1	Axis 2	Axis 3	Axis 4	
70	220	370	520	[Pr.43] OPR method
71	221	371	521	[Pr.44] OPR direction
72 73	222 223	372 373	522 523	[Pr.45] OP address
74 75	224 225	374 375	524 525	[Pr.46] OPR speed
76 77	226 227	376 377	526 527	[Pr.47] Creep speed
78	228	378	528	[Pr.48] OPR retry

OPR detailed parameters

Buffer memory address				Item
Axis 1	Axis 2	Axis 3	Axis 4	
79	229	379	529	[Pr.49] OPR dwell time
80 81	230 231	380 381	530 531	[Pr.50] Setting for the movement amount after near-point dog ON
82	232	382	532	[Pr.51] OPR acceleration time selection
83	233	383	533	[Pr.52] OPR deceleration time selection
84 85	234 235	384 385	534 535	[Pr.53] OP shift amount
86	236	386	536	[Pr.54] OPR torque limit value
87	237	387	537	[Pr.55] Deviation counter clear signal output time
88	238	388	538	[Pr.56] Speed designation during OP shift
89	239	389	539	[Pr.57] Dwell time during OPR retry

11.2 Monitor Data [Md.]

System monitor data [Md.]

Buffer memory address				Item	
Axis 1	Axis 2	Axis 3	Axis 4		
1200				[Md.1] In test mode flag	
1201 to 1211				Use prohibited	
1212				Start history 0	[Md.3] Start information
1213					[Md.4] Start No.
1440					[Md.50] Start (Year: month)
1214					[Md.5] Start (Day: hour)
1215					[Md.6] Start (Minute: second)
1216					[Md.7] Error judgment
1217				Start history 1	[Md.3] Start information
1218					[Md.4] Start No.
1441					[Md.50] Start (Year: month)
1219					[Md.5] Start (Day: hour)
1220					[Md.6] Start (Minute: second)
1221					[Md.7] Error judgment
1222				Start history 2	[Md.3] Start information
1223					[Md.4] Start No.
1442					[Md.50] Start (Year: month)
1224					[Md.5] Start (Day: hour)
1225					[Md.6] Start (Minute: second)
1226					[Md.7] Error judgment
1227				Start history 3	[Md.3] Start information
1228					[Md.4] Start No.
1443					[Md.50] Start (Year: month)
1229					[Md.5] Start (Day: hour)
1230					[Md.6] Start (Minute: second)
1231					[Md.7] Error judgment
1232				Start history 4	[Md.3] Start information
1233					[Md.4] Start No.
1444					[Md.50] Start (Year: month)
1234					[Md.5] Start (Day: hour)
1235					[Md.6] Start (Minute: second)
1236					[Md.7] Error judgment
1237				Start history 5	[Md.3] Start information
1238					[Md.4] Start No.
1445					[Md.50] Start (Year: month)
1239					[Md.5] Start (Day: hour)
1240					[Md.6] Start (Minute: second)
1241					[Md.7] Error judgment
1242				Start history 6	[Md.3] Start information
1243					[Md.4] Start No.
1446					[Md.50] Start (Year: month)
1244					[Md.5] Start (Day: hour)
1245					[Md.6] Start (Minute: second)
1246					[Md.7] Error judgment

Buffer memory address				Item	
Axis 1	Axis 2	Axis 3	Axis 4		
1247				Start history 7	[Md.3] Start information
1248					[Md.4] Start No.
1447					[Md.50] Start (Year: month)
1249					[Md.5] Start (Day: hour)
1250					[Md.6] Start (Minute: second)
1251					[Md.7] Error judgment
1252				Start history 8	[Md.3] Start information
1253					[Md.4] Start No.
1448					[Md.50] Start (Year: month)
1254					[Md.5] Start (Day: hour)
1255					[Md.6] Start (Minute: second)
1256					[Md.7] Error judgment
1257				Start history 9	[Md.3] Start information
1258					[Md.4] Start No.
1449					[Md.50] Start (Year: month)
1259					[Md.5] Start (Day: hour)
1260					[Md.6] Start (Minute: second)
1261					[Md.7] Error judgment
1262				Start history 10	[Md.3] Start information
1263					[Md.4] Start No.
1450					[Md.50] Start (Year: month)
1264					[Md.5] Start (Day: hour)
1265					[Md.6] Start (Minute: second)
1266					[Md.7] Error judgment
1267				Start history 11	[Md.3] Start information
1268					[Md.4] Start No.
1451					[Md.50] Start (Year: month)
1269					[Md.5] Start (Day: hour)
1270					[Md.6] Start (Minute: second)
1271					[Md.7] Error judgment
1272				Start history 12	[Md.3] Start information
1273					[Md.4] Start No.
1452					[Md.50] Start (Year: month)
1274					[Md.5] Start (Day: hour)
1275					[Md.6] Start (Minute: second)
1276					[Md.7] Error judgment
1277				Start history 13	[Md.3] Start information
1278					[Md.4] Start No.
1453					[Md.50] Start (Year: month)
1279					[Md.5] Start (Day: hour)
1280					[Md.6] Start (Minute: second)
1281					[Md.7] Error judgment
1282				Start history 14	[Md.3] Start information
1283					[Md.4] Start No.
1454					[Md.50] Start (Year: month)
1284					[Md.5] Start (Day: hour)
1285					[Md.6] Start (Minute: second)
1286					[Md.7] Error judgment

Buffer memory address				Item	
Axis 1	Axis 2	Axis 3	Axis 4		
1287				Start history 15	[Md.3] Start information
1288					[Md.4] Start No.
1455					[Md.50] Start (Year: month)
1289					[Md.5] Start (Day: hour)
1290					[Md.6] Start (Minute: second)
1291					[Md.7] Error judgment
1292				[Md.8] Start history pointer	
1293				Error history 0	[Md.9] Axis in which the error occurred
1294					[Md.10] Axis error No.
1456					[Md.51] Axis error occurrence (Year: month)
1295					[Md.11] Axis error occurrence (Day: hour)
1296					[Md.12] Axis error occurrence (Minute: second)
1297				Error history 1	[Md.9] Axis in which the error occurred
1298					[Md.10] Axis error No.
1457					[Md.51] Axis error occurrence (Year: month)
1299					[Md.11] Axis error occurrence (Day: hour)
1300					[Md.12] Axis error occurrence (Minute: second)
1301				Error history 2	[Md.9] Axis in which the error occurred
1302					[Md.10] Axis error No.
1458					[Md.51] Axis error occurrence (Year: month)
1303					[Md.11] Axis error occurrence (Day: hour)
1304					[Md.12] Axis error occurrence (Minute: second)
1305				Error history 3	[Md.9] Axis in which the error occurred
1306					[Md.10] Axis error No.
1459					[Md.51] Axis error occurrence (Year: month)
1307					[Md.11] Axis error occurrence (Day: hour)
1308					[Md.12] Axis error occurrence (Minute: second)
1309				Error history 4	[Md.9] Axis in which the error occurred
1310					[Md.10] Axis error No.
1460					[Md.51] Axis error occurrence (Year: month)
1311					[Md.11] Axis error occurrence (Day: hour)
1312					[Md.12] Axis error occurrence (Minute: second)
1313				Error history 5	[Md.9] Axis in which the error occurred
1314					[Md.10] Axis error No.
1461					[Md.51] Axis error occurrence (Year: month)
1315					[Md.11] Axis error occurrence (Day: hour)
1316					[Md.12] Axis error occurrence (Minute: second)
1317				Error history 6	[Md.9] Axis in which the error occurred
1318					[Md.10] Axis error No.
1462					[Md.51] Axis error occurrence (Year: month)
1319					[Md.11] Axis error occurrence (Day: hour)
1320					[Md.12] Axis error occurrence (Minute: second)
1321				Error history 7	[Md.9] Axis in which the error occurred
1322					[Md.10] Axis error No.
1463					[Md.51] Axis error occurrence (Year: month)
1323					[Md.11] Axis error occurrence (Day: hour)
1324					[Md.12] Axis error occurrence (Minute: second)

Buffer memory address				Item	
Axis 1	Axis 2	Axis 3	Axis 4		
1325				Error history 8	[Md.9] Axis in which the error occurred
1326					[Md.10] Axis error No.
1464					[Md.51] Axis error occurrence (Year: month)
1327					[Md.11] Axis error occurrence (Day: hour)
1328					[Md.12] Axis error occurrence (Minute: second)
1329				Error history 9	[Md.9] Axis in which the error occurred
1330					[Md.10] Axis error No.
1465					[Md.51] Axis error occurrence (Year: month)
1331					[Md.11] Axis error occurrence (Day: hour)
1332					[Md.12] Axis error occurrence (Minute: second)
1333				Error history 10	[Md.9] Axis in which the error occurred
1334					[Md.10] Axis error No.
1466					[Md.51] Axis error occurrence (Year: month)
1335					[Md.11] Axis error occurrence (Day: hour)
1336					[Md.12] Axis error occurrence (Minute: second)
1337				Error history 11	[Md.9] Axis in which the error occurred
1338					[Md.10] Axis error No.
1467					[Md.51] Axis error occurrence (Year: month)
1339					[Md.11] Axis error occurrence (Day: hour)
1340					[Md.12] Axis error occurrence (Minute: second)
1341				Error history 12	[Md.9] Axis in which the error occurred
1342					[Md.10] Axis error No.
1468					[Md.51] Axis error occurrence (Year: month)
1343					[Md.11] Axis error occurrence (Day: hour)
1344					[Md.12] Axis error occurrence (Minute: second)
1345				Error history 13	[Md.9] Axis in which the error occurred
1346					[Md.10] Axis error No.
1469					[Md.51] Axis error occurrence (Year: month)
1347					[Md.11] Axis error occurrence (Day: hour)
1348					[Md.12] Axis error occurrence (Minute: second)
1349				Error history 14	[Md.9] Axis in which the error occurred
1350					[Md.10] Axis error No.
1470					[Md.51] Axis error occurrence (Year: month)
1351					[Md.11] Axis error occurrence (Day: hour)
1352					[Md.12] Axis error occurrence (Minute: second)
1353				Error history 15	[Md.9] Axis in which the error occurred
1354					[Md.10] Axis error No.
1471					[Md.51] Axis error occurrence (Year: month)
1355					[Md.11] Axis error occurrence (Day: hour)
1356					[Md.12] Axis error occurrence (Minute: second)
1357				[Md.13] Error history pointer	
1358				Warning history 0	[Md.14] Axis in which the warning occurred
1359					[Md.15] Axis warning No.
1472					[Md.52] Axis warning occurrence (Year: month)
1360					[Md.16] Axis warning occurrence (Day: hour)
1361					[Md.17] Axis warning occurrence (Minute: second)

Buffer memory address				Item	
Axis 1	Axis 2	Axis 3	Axis 4		
1362				Warning history 1	[Md.14] Axis in which the warning occurred
1363					[Md.15] Axis warning No.
1473					[Md.52] Axis warning occurrence (Year: month)
1364					[Md.16] Axis warning occurrence (Day: hour)
1365					[Md.17] Axis warning occurrence (Minute: second)
1366				Warning history 2	[Md.14] Axis in which the warning occurred
1367					[Md.15] Axis warning No.
1474					[Md.52] Axis warning occurrence (Year: month)
1368					[Md.16] Axis warning occurrence (Day: hour)
1369					[Md.17] Axis warning occurrence (Minute: second)
1370				Warning history 3	[Md.14] Axis in which the warning occurred
1371					[Md.15] Axis warning No.
1475					[Md.52] Axis warning occurrence (Year: month)
1372					[Md.16] Axis warning occurrence (Day: hour)
1373					[Md.17] Axis warning occurrence (Minute: second)
1374				Warning history 4	[Md.14] Axis in which the warning occurred
1375					[Md.15] Axis warning No.
1476					[Md.52] Axis warning occurrence (Year: month)
1376					[Md.16] Axis warning occurrence (Day: hour)
1377					[Md.17] Axis warning occurrence (Minute: second)
1378				Warning history 5	[Md.14] Axis in which the warning occurred
1379					[Md.15] Axis warning No.
1477					[Md.52] Axis warning occurrence (Year: month)
1380					[Md.16] Axis warning occurrence (Day: hour)
1381					[Md.17] Axis warning occurrence (Minute: second)
1382				Warning history 6	[Md.14] Axis in which the warning occurred
1383					[Md.15] Axis warning No.
1478					[Md.52] Axis warning occurrence (Year: month)
1384					[Md.16] Axis warning occurrence (Day: hour)
1385					[Md.17] Axis warning occurrence (Minute: second)
1386				Warning history 7	[Md.14] Axis in which the warning occurred
1387					[Md.15] Axis warning No.
1479					[Md.52] Axis warning occurrence (Year: month)
1388					[Md.16] Axis warning occurrence (Day: hour)
1389					[Md.17] Axis warning occurrence (Minute: second)
1390				Warning history 8	[Md.14] Axis in which the warning occurred
1391					[Md.15] Axis warning No.
1480					[Md.52] Axis warning occurrence (Year: month)
1392					[Md.16] Axis warning occurrence (Day: hour)
1393					[Md.17] Axis warning occurrence (Minute: second)
1394				Warning history 9	[Md.14] Axis in which the warning occurred
1395					[Md.15] Axis warning No.
1481					[Md.52] Axis warning occurrence (Year: month)
1396					[Md.16] Axis warning occurrence (Day: hour)
1397					[Md.17] Axis warning occurrence (Minute: second)

Buffer memory address				Item	
Axis 1	Axis 2	Axis 3	Axis 4		
1398				Warning history 10	[Md.14] Axis in which the warning occurred
1399					[Md.15] Axis warning No.
1482					[Md.52] Axis warning occurrence (Year: month)
1400					[Md.16] Axis warning occurrence (Day: hour)
1401					[Md.17] Axis warning occurrence (Minute: second)
1402				Warning history 11	[Md.14] Axis in which the warning occurred
1403					[Md.15] Axis warning No.
1483					[Md.52] Axis warning occurrence (Year: month)
1404					[Md.16] Axis warning occurrence (Day: hour)
1405					[Md.17] Axis warning occurrence (Minute: second)
1406				Warning history 12	[Md.14] Axis in which the warning occurred
1407					[Md.15] Axis warning No.
1484					[Md.52] Axis warning occurrence (Year: month)
1408					[Md.16] Axis warning occurrence (Day: hour)
1409					[Md.17] Axis warning occurrence (Minute: second)
1410				Warning history 13	[Md.14] Axis in which the warning occurred
1411					[Md.15] Axis warning No.
1485					[Md.52] Axis warning occurrence (Year: month)
1412					[Md.16] Axis warning occurrence (Day: hour)
1413					[Md.17] Axis warning occurrence (Minute: second)
1414				Warning history 14	[Md.14] Axis in which the warning occurred
1415					[Md.15] Axis warning No.
1486					[Md.52] Axis warning occurrence (Year: month)
1416					[Md.16] Axis warning occurrence (Day: hour)
1417					[Md.17] Axis warning occurrence (Minute: second)
1418				Warning history 15	[Md.14] Axis in which the warning occurred
1419					[Md.15] Axis warning No.
1487					[Md.52] Axis warning occurrence (Year: month)
1420					[Md.16] Axis warning occurrence (Day: hour)
1421					[Md.17] Axis warning occurrence (Minute: second)
1422				[Md.18] Warning history pointer	
1424 1425				[Md.19] No. of write accesses to flash ROM	

Axis monitor data [Md.]

Buffer memory address				Item
Axis 1	Axis 2	Axis 3	Axis 4	
800 801	900 901	1000 1001	1100 1101	[Md.20] Current feed value
802 803	902 903	1002 1003	1102 1103	[Md.21] Machine feed value
804 805	904 905	1004 1005	1104 1105	[Md.22] Feedrate
806	906	1006	1106	[Md.23] Axis error No.
807	907	1007	1107	[Md.24] Axis warning No.
808	908	1008	1108	[Md.25] Valid M code
809	909	1009	1109	[Md.26] Axis operation status
810 811	910 911	1010 1011	1110 1111	[Md.27] Current speed
812 813	912 913	1012 1013	1112 1113	[Md.28] Axis feedrate
814 815	914 915	1014 1015	1114 1115	[Md.29] Speed-position switching control positioning amount
816	916	1016	1116	[Md.30] External input/output signal
817	917	1017	1117	[Md.31] Status
818 819	918 919	1018 1019	1118 1119	[Md.32] Target value
820 821	920 921	1020 1021	1120 1121	[Md.33] Target speed
824 825	924 925	1024 1025	1124 1125	[Md.34] Movement amount after near-point dog ON
826	926	1026	1126	[Md.35] Torque limit stored value
827	927	1027	1127	[Md.36] Special start data instruction code setting value
828	928	1028	1128	[Md.37] Special start data instruction parameter setting value
829	929	1029	1129	[Md.38] Start positioning data No. setting value.
830	930	1030	1130	[Md.39] In speed limit flag
831	931	1031	1131	[Md.40] In speed change processing flag
832	932	1032	1132	[Md.41] Special start repetition counter
833	933	1033	1133	[Md.42] Control system repetition counter
834	934	1034	1134	[Md.43] Start data pointer being executed
835	935	1035	1135	[Md.44] Positioning data No. being executed
836	936	1036	1136	[Md.45] Block No. being executed
837	937	1037	1137	[Md.46] Last executed positioning data No.
838 to 847	938 to 947	1038 to 1047	1138 to 1147	[Md.47] Positioning data being executed
899	999	1099	1199	[Md.48] Deceleration start flag

11.3 Control Data [Cd.]

Buffer memory address				Item
Axis 1	Axis 2	Axis 3	Axis 4	
1500	1600	1700	1800	[Cd.3] Positioning start No.
1501	1601	1701	1801	[Cd.4] Positioning starting point No.
1502	1602	1702	1802	[Cd.5] Axis error reset
1503	1603	1703	1803	[Cd.6] Restart command
1504	1604	1704	1804	[Cd.7] M code OFF request
1505	1605	1705	1805	[Cd.8] External command valid
1506 1507	1606 1607	1706 1707	1806 1807	[Cd.9] New current value
1508 1509	1608 1609	1708 1709	1808 1809	[Cd.10] New acceleration time value
1510 1511	1610 1611	1710 1711	1810 1811	[Cd.11] New deceleration time value
1512	1612	1712	1812	[Cd.12] Acceleration/deceleration time change during speed change, enable/disable selection
1513	1613	1713	1813	[Cd.13] Positioning operation speed override
1514 1515	1614 1615	1714 1715	1814 1815	[Cd.14] New speed value
1516	1616	1716	1816	[Cd.15] Speed change request
1517	1617	1717	1817	[Cd.16] Inching movement amount
1518 1519	1618 1619	1718 1719	1818 1819	[Cd.17] JOG speed
1520	1620	1720	1820	[Cd.18] Continuous operation interrupt request
1521	1621	1721	1821	[Cd.19] OPR request flag OFF request
1522 1523	1622 1623	1722 1723	1822 1823	[Cd.20] Manual pulse generator 1 pulse input magnification
1524	1624	1724	1824	[Cd.21] Manual pulse generator enable flag
1525	1625	1725	1825	[Cd.22] New torque value
1526 1527	1626 1627	1726 1727	1826 1927	[Cd.23] Speed-position switching control movement amount change register
1528	1628	1728	1828	[Cd.24] Speed-position switching enable flag
1529	1629	1729	1829	Use prohibited
1530 1531	1630 1631	1730 1731	1830 1831	[Cd.25] Position-speed switching control speed change register
1532	1632	1732	1832	[Cd.26] Position-speed switching enable flag
1533	1633	1733	1833	Use prohibited
1534 1535	1634 1635	1734 1735	1834 1835	[Cd.27] Target position change value (new address)
1536 1537	1636 1637	1736 1737	1836 1837	[Cd.28] Target position change value (new speed)
1538	1638	1738	1838	[Cd.29] Target position change request flag
1539	1639	1739	1839	Use prohibited
1540	1640	1740	1840	[Cd.30] Simultaneous starting axis start data No. (axis 1 start data No.)
1541	1641	1741	1841	[Cd.31] Simultaneous starting axis start data No. (axis 2 start data No.)
1542	1642	1742	1842	[Cd.32] Simultaneous starting axis start data No. (axis 3 start data No.)
1543	1643	1743	1843	[Cd.33] Simultaneous starting axis start data No. (axis 4 start data No.)
1544	1644	1744	1844	[Cd.34] Step mode
1545	1645	1745	1845	[Cd.35] Step valid flag
1546	1646	1746	1846	[Cd.36] Step start information

Buffer memory address				Item
Axis 1	Axis 2	Axis 3	Axis 4	
1547	1647	1747	1847	[Cd.37] Skip command
1548	1648	1748	1848	[Cd.38] Teaching data selection
1549	1649	1749	1849	[Cd.39] Teaching positioning data No.
1550	1650	1750	1850	[Cd.40] ABS direction in degrees
1900				[Cd.1] Flash ROM write request
1901				[Cd.2] Parameter initialization request
1905				[Cd.41] Deceleration start flag valid
1907				[Cd.42] Stop command processing for deceleration stop selection

11.4 Positioning Data [Da.]

Positioning data

Buffer memory address				Item	
Axis 1	Axis 2	Axis 3	Axis 4		
2000	8000	14000	20000	No.1	[Da.1] Operation pattern [Da.2] Control system [Da.3] Acceleration time No. [Da.4] Deceleration time No. [Da.5] Axis to be interpolated
2001	8001	14001	20001		[Da.10] M code/condition data No. /No. of LOOP to LEND repetitions
2002	8002	14002	20002		[Da.9] Dwell time (JUMP destination positioning data No.)
2003	8003	14003	20003		[Da.27] M code ON signal output timing [Da.28] ABS direction in degrees [Da.29] Interpolation speed designation method
2004 2005	8004 8005	14004 14005	20004 20005		[Da.8] Command speed
2006 2007	8006 8007	14006 14007	20006 20007		[Da.6] Positioning address/movement amount
2008 2009	8008 8009	14008 14009	20008 20009		[Da.7] Arc address
2010 to 2019	8010 to 8019	14010 to 14019	20010 to 20019	No.2	
2020 to 2029	8020 to 8029	14020 to 14029	20020 to 20029	No.3	
⋮	⋮	⋮	⋮	⋮	
7990 to 7999	13990 to 13999	19990 to 19999	25990 to 25999	No.600	

Starting block 0

Buffer memory address				Item	
Axis 1	Axis 2	Axis 3	Axis 4		
26000	27000	28000	29000	Block start data 1st point	[Da.11] Shape [Da.12] Start data No.
26050	27050	28050	29050		[Da.13] Special start instruction [Da.14] Parameter
26001	27001	28001	29001	Block start data 2nd point	
26051	27051	28051	29051		
26002	27002	28002	29002	Block start data 3rd point	
26052	27052	28052	29052		
⋮	⋮	⋮	⋮	⋮	
26049	27049	28049	29049	Block start data 50th point	
26099	27099	28099	29099		
26100	27100	28100	29100	Condition data No.1	[Da.15] Condition target
					[Da.16] Condition operator
26102 26103	27102 27103	28102 28103	29102 29103		[Da.17] Address
26104 26405	27104 27405	28104 28405	29104 29405		[Da.18] Parameter 1
26106 26107	27106 27107	28106 28107	29106 29107		[Da.19] Parameter 2
26110 to 26119	27110 to 27119	28110 to 28119	29110 to 29119	Condition data No.2	
26120 to 26129	27120 to 27129	28120 to 28129	29120 to 29129	Condition data No.3	
⋮	⋮	⋮	⋮	⋮	
26190 to 26199	27190 to 27199	28190 to 28199	29190 to 29199	Condition data No.10	

Starting block 1

Buffer memory address				Item
Axis 1	Axis 2	Axis 3	Axis 4	
26200 to 26299	27200 to 27299	28200 to 28299	29200 to 29299	Block start data
26300 to 26399	27300 to 27399	28300 to 28399	29300 to 29399	Condition data

Starting block 2

Buffer memory address				Item
Axis 1	Axis 2	Axis 3	Axis 4	
26400 to 26499	27400 to 27499	28400 to 28499	29400 to 29499	Block start data
26500 to 26599	27500 to 27599	28500 to 28599	29500 to 29599	Condition data

Starting block 3

Buffer memory address				Item
Axis 1	Axis 2	Axis 3	Axis 4	
26600 to 26699	27600 to 27699	28600 to 28699	29600 to 29699	Block start data
26700 to 26799	27700 to 27799	28700 to 28799	29700 to 29799	Condition data

Starting block 4

Buffer memory address				Item
Axis 1	Axis 2	Axis 3	Axis 4	
26800 to 26899	27800 to 27899	28800 to 28899	29800 to 29899	Block start data
26900 to 26999	27900 to 27999	28900 to 28999	29900 to 29999	Condition data

Programmable controller CPU memory area

Buffer memory address				Item
Axis 1	Axis 2	Axis 3	Axis 4	
30000 to 30099				Condition judgment target data of the condition data

REVISIONS

Version	Date of Issue	Revision
—	April 2009	First edition
A	May 2010	(3) in Section 2.2 "Servo amplifier connection example" was reviewed.
B	September 2017	The descriptions of the QD75P□N/QD75D□N were added.
C	July 2019	• Available for e-Manual Viewer • Section 5.2 was reviewed.